Evaluating Communication Technologies for the Deaf and Hard of Hearing

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ABSTRACT

For the deaf to communicate in a hearing world, they often rely on technology. This study, completed by an interdisciplinary team for the Victorian Deaf Society in Melbourne, Australia, examines technology usage, availability, ease of use, and effectiveness. Additionally, technologies in use in other parts of world and other upcoming technologies were researched. Based off surveys, interviews, and a focus group, recommendations are provided suggesting technology improvements and upcoming technologies which could be used to improve communication for the deaf.

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EXECUTIVE SUMMARY

Communication has become an integral part of the world in which we live. Information is shared around the world every day, and although most of us think of communication as occurring between two parties, even public announcements at train stations are a form of communication. This sharing of information has made it possible for different cultures to come together, but the Deaf[1] and hard of hearing have the disadvantage of living in a world that has been designed around the ability to hear. Most people take for granted that day to day things rely on the ability to hear; even something as inconsequential as not hearing the sound of a door opening and closing, can affect a person's life.

In Australia the deaf[2] population consists of about three million people. This three million includes those who have lost their hearing later in life due to age, disease or injury, as well as some 20,000 – 40,000 people who are signing Deaf (Australia Communication Exchange, 2011). Although this may seem like a large number, the population of Australia is about 23 million people, which makes the deaf or signing Deaf populations only a small percentage of the total population (Australian Bureau of Statistics, 2012). The deaf population may be in the minority, but this helps to explain why so much of the world has been developed around hearing. In order to function within this world the deaf continue to develop ways to communicate that do not require sound. Advances in technology have become a catalyst for newer and more convenient methods of communication for the deaf population.

The Victorian Deaf Society (Vicdeaf) has been working to provide services to the deaf community of Victoria, Australia for over 100 years (Vicdeaf, 2011). As technology advances, Vicdeaf recognizes that communication technologies are playing an increasingly larger role in the way the Deaf and hard of hearing communicate. Technologies such as TTY, SMS, Email, Fax, and more recently video-based technology, are available to the deaf to use in their daily lives. However, there are still drawbacks and constraints in some of the technology the deaf are using. In order to gain a better understanding of the types of technologies that work best and why, Vicdeaf needed information from the deaf community itself.

The goal for our project was to determine the optimal communication technologies for the Deaf and hard of hearing community in Victoria, Australia and to advise Vicdeaf on the best

[1] In this case "Deaf" with an upper case "D" is used to refer to those who identify with Deaf culture
[2] The use of a lower case "d" in deaf is used in this paper to refer to all deaf and hard of hearing

way of providing the optimal technologies to their clients. Our objectives to accomplish this goal were:

1. Determine which technologies people have access to
2. Determine which technologies are most commonly used
3. Identify the preferences of the Deaf and hard of hearing in relation to communication technology
4. Identify the constraints regarding the use of different technologies
5. Evaluate each technology for the preferences and constraints identified
6. Provide recommendations on the most suitable technologies as well as possible implementations of these different technologies.

Prior to arriving in Australia our team conducted background research on the different technology options available to the Deaf and hard of hearing. In addition, we researched Deaf culture and values in order to understand better the community's point of view. We gathered information from previous studies amongst the deaf community in the United Kingdom, Australia and Germany. These studies provided us with information on the technologies that were currently available and what some of the perceptions were about those technologies. We also researched technologies that were currently used in the United States as well as some technologies that were still in development and how those technologies could be used within the deaf community in Victoria.

After arriving onsite our team gathered data about the Victorian deaf community by conducting a survey amongst the Deaf and hard of hearing within the state. We also held a focus group amongst some local members of the deaf community. The questions that we used on our survey and during our focus group were based upon the research we had previously conducted before coming to Australia.

Through our survey we reached 114 people and in our focus group we interviewed five Deaf people from Melbourne. After receiving the data from both our survey and focus group it was clear that there were some favorite forms of communication. Although many individuals who are signing Deaf do not have strong literacy skills, text-based communication seemed to be an overwhelming favorite. Email and SMS were the two most popular forms of communication used, whereas video-based communication such as videophones and video chatting were not as

popular. Many respondents to the survey provided comments that suggested a reason for this may be that through text-based communication a deaf person can correspond with either another deaf person or a hearing person. Video-based technology only allows a Deaf person to communicate with someone who signs; otherwise an interpreter must be used.

Our findings also indicated that an overwhelming percentage of deaf people do not use Video Relay Interpreting (VRI). On our survey some respondents were hard of hearing and not well versed in sign language so VRI was of no use to them. However, many respondents who were Deaf often responded that they did not know what VRI was or how to use it. Our results suggest that one of the biggest problems in providing VRI service is a lack of knowledge of the technology. Part of our recommendations to Vicdeaf addressed extending knowledge about VRI and other services.

One of the biggest problems is a lack of knowledge in the deaf community of what is available. In order to address this problem our first recommendation was to educate the surrounding deaf community. Although Vicdeaf has done many outreach programs and provides workshops on a regular basis, this information is still not reaching the serviced community. It is apparent from our survey that the deaf want technologies that are easy and convenient to use, and the same can be said for the way in which they want to receive information.

Vicdeaf has both a Facebook and Twitter page, as well as a database of email addresses of some members of the deaf community. However, there is no way to tell how many people check Vicdeaf's web pages frequently or how many actually read the emails that are sent out. Instead of relying on web pages and email, a convenient way to send information to clients would be to develop a smartphone application. Many respondents to the survey specifically indicated they used an iPhone to communicate and some even took the survey on an iPhone. If Vicdeaf could develop an application they would be able to send notifications and messages to their clients quickly and easily. Since most people carry a phone with them, Vicdeaf's clients would have more immediate access to information than if they had to wait until they got to a computer. Our team also made recommendations to Vicdeaf concerning other possible application purposes as well as investing in products that can easily facilitate video communication.

Although our team made additional recommendations to Vicdeaf, increasing education and advertising for events and services were the most valuable. We believe all of the

recommendations we provided will benefit the deaf community of Victoria. Although this community is in the minority of the population, they still require and deserve effective resources so that they can function in today's world just as any other person does. The ability to hear affects the way a person lives and develops, but it does not change that person's desire for effective communication.

1 INTRODUCTION

The ability to communicate has made it possible for different cultures to come together. However, communication has developed within a hearing world, requiring those who are Deaf[1] or have difficulty hearing to have to adapt. In Australia, there are between 20,000 and 40,000 Deaf individuals (Australia Communication Exchange, 2011). Although this is a large number of people, it is much smaller than the Deaf population of the United States, which is about 580,000 people (Harrington, 2010). In both of these countries there is a much larger population of people who are hard of hearing, which include those who have lost their hearing over time (Harrington, 2010; Power & Power, 2010).

The ability to communicate is important to the deaf[2] regardless of where they live. Just as left-handed people must function in world largely designed for right-handed people, the deaf must function in a world that has been designed around the ability to hear. In order to communicate in such a world, the deaf have developed different ways to share information. Countries with larger deaf populations and advanced technology, like the United States, can be sources of new ideas for easier communication.

Advancements in technology have helped to provide communication options for the deaf, but in some areas of the world these advancements are still not ideal. Australia is sparsely populated in many areas, and it can be difficult to provide viable communication options to every deaf person within the country. Even the state of Victoria, one of Australia's smallest states, is about the size of the British Isles (Visit Victoria, 2011). Geographically, it is difficult to provide aid to every deaf person in the state, especially those who do not live near a major city. Cost is also a concern because advanced technologies can be expensive and may make it difficult for some people to own effective means to enhance their communication. With over 2,000 signing Deaf in Victoria alone and countless other hard of hearing individuals, there are many people who could benefit from technologies that make communication easier and more convenient (Vicdeaf, 2007).

Many organizations exist to provide the deaf with better access to resources. In Victoria, one such organization is the Victorian Deaf Society (Vicdeaf). Research by other organizations and people had been conducted both in Australia and elsewhere in the world regarding current

[1] In this case "Deaf" with an upper case "D" is used to refer to those who identify with Deaf culture
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technologies like Teletypewriters (TTYs), videophones, short message service (SMS) and Email (Pilling & Barrett, 2008; Power & Power, 2010). A previous IQP with Vicdeaf also looked at a fairly newer technology called video relay interpreting, or VRI (Gottardi, Shafer & Waterman, 2008). Since that IQP, VRI systems were implemented and are currently used by some deaf Victorians (Department of Human Services, 2011). Vicdeaf had a lot of previous information, but they were missing some vital information specific to Victoria. The goal of our project was to provide Vicdeaf with some of that missing information.

Although Vicdeaf knew about current technology and about the research that had been done previously, there was not much specific information regarding the preferences of deaf Victorians themselves. Vicdeaf needed to know which aspects of current communication technologies were preferable within the deaf community and how technology used in other parts of the world could be applied to Victoria. The information presented in this report will help Vicdeaf provide more effective communication options to the community they serve.

In an attempt to gather more information about preferred communication options our team surveyed and interviewed the deaf population of Victoria, Australia. Our goal was to identify what deaf Victorians did and did not want in their technology, as well as how preferred forms of technology could be best implemented. The objectives to complete this goal included determining the availability of communication technologies, identifying the most commonly used forms of communication and determining the preferences and constraints of the Victorian deaf population. By gaining this information from deaf Victorians, as well as from resources in other countries, we have provided Vicdeaf with an idea of preferred communication technologies within the Victorian deaf community, as well as recommendations for newer technologies and how those technologies might be implemented.

2 BACKGROUND

A hearing person not involved in the deaf community often does not think about what it means to be deaf. Not only do the following sections provide background information that is pertinent to understanding the scope of our project, they also provide information that is instrumental in understanding how deafness affects a person's life. We begin the chapter by discussing different types of hearing impairments, as well as aspects of Deaf culture. The information provided can generally be applied to Deaf communities around the world and is not specific to one location or group of people. The purpose of this information is to provide a better understanding of what it means to be deaf and how communication technology directly affects a deaf person's life, since they are more limited in communication technology options. To understand what types of services are available to the deaf in Victoria, we provide background information on the Victorian Deaf Society (Vicdeaf). Our group will also discuss technologies that are currently available to the Deaf and hard of hearing, as well as some newer technologies that can be used by the deaf in their day-to-day lives as they become more available. We reviewed several studies that previously considered communication technologies for the deaf and which technologies this community prefers to use. Using information from these studies as well as from other sources, we will discuss the availability and strengths of current technologies used by the deaf as well as the drawbacks of these technologies.

2.1 Deaf Community

The Deaf community is a tight-knit group that prides itself upon its culture and the strong connections they share with each other. Our team researched Deaf culture in order to understand how the ideals of this community can affect our methodology and outreach. We first explain the types of hearing loss than can affect an individual, in order to provide an understanding of the difference between those who are born deaf and those who lose their hearing over time. Since a person's ability to communicate is greatly affected by the type of family they are born into, information is also provided on how language development occurs in different types of environments. Finally we discuss Deaf culture in order to extend understanding about this tight-knit community.

2.1.1 Hearing Impairments

Hearing impairments can be broken down into multiple types and classifications. Commonly, hearing loss is described by the portion of the auditory system that is affected. The three different types of hearing loss are conductive, sensorineural, or mixed.

The first type, conductive, refers to when sound cannot travel through the outer ear to the eardrum and middle ear. As seen in Figure 1, the middle ear contains the part of the ear that is a canal for sound waves to travel through until it hits the eardrum between the middle and inner ear. Causes of conductive hearing loss include fluid or foreign body in the ear, an ear or sinus infection, allergies, tumors etc. Any of these will result in a person's hearing becoming muffled (American Speech-Language-Hearing, 2011).

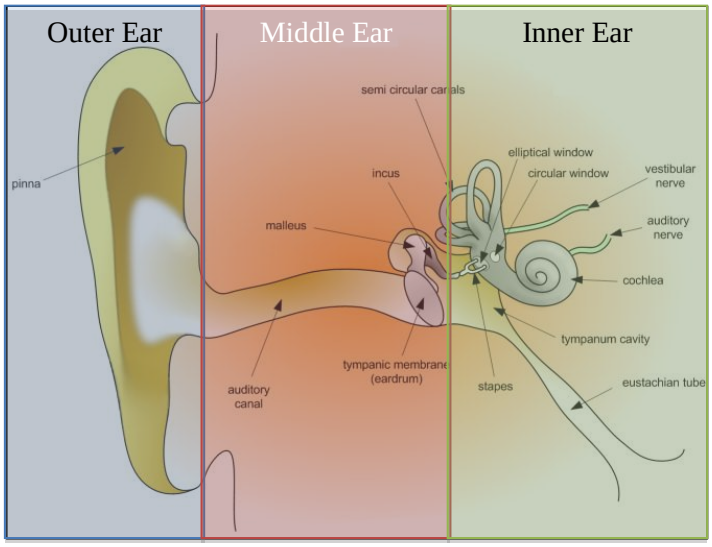

Figure 1 - Anatomy of ear (Adapted From: Pickard, 2006)

Sensorineural hearing loss is rooted in the nerves and inner ear. The nerves are shown in the "Inner Ear" section of the Figure, and are connected to the eardrum. It is when these nerves are damaged that sensorineural loss occurs. Sensorineural loss reduces sound even more than conductive hearing loss, and is often permanent. Causes of sensorineural hearing loss include constant exposure to loud noises, aging, and head trauma among other causes (American Speech-Language-Hearing, 2011).

Finally, mixed hearing loss is a combination of conductive and sensorineural hearing loss. Mixed hearing loss describes cases where both the inner and outer ear are damaged from any of the previously mentioned causes (American Speech-Language-Hearing, 2011).

In addition to the various types, hearing loss can be further classified by the degree and configuration of the loss. Degree of hearing loss refers to the severity of hearing loss, defined by the decibel range that a person has lost. A decibel is the unit of measure for sound intensity and it is measured on a logarithmic scale. Meaning that a sound at 1 dB is ten times as loud as a sound at 0 dB (Smith, 1998). Table 1 shows degrees of hearing loss and the hearing loss range

Table 1 - Degree of Hearing Loss (Vicdeaf Information Team, 2011)

Degree	Hearing Loss Range (dB HL)
Normal	0-20
Mild	21-45
Moderate	46-60
Moderately Severe	61-75
Severe	76-90
Profound	91+

associated with each (Vicdeaf Information Team, 2011). A "hearing" person is generally considered to be able to hear sounds between 0 dB and 120 dB (Smith, 1998). The information in the table below shows how many decibels in that range a person cannot hear

Someone with a normal degree of hearing loss has lost anywhere from 0 dB (perfect hearing) to 20 dB. This degree of hearing loss refers to the people who do not have any hearing impairments but also includes slight hearing loss due to aging. When a person has mild hearing loss they have trouble hearing soft speech, but are still able to function in situations where voices and/or sounds are clear. If a child has mild hearing loss their language skills often develop normally with the assistance of a hearing aid (Vicdeaf Information Team, 2011)

Moderate hearing loss results in a person having greater difficulty understanding conversations. A person with this degree of hearing loss often has to turn up a TV or radio in order to hear and if a child is born with moderate hearing loss, their language development can be greatly affected if hearing aids are not used. Often times hearing aids will assist most of the hearing problems associated with this type of hearing loss (Vicdeaf Information Team, 2011).

Moderately severe, severe and profound hearing losses are the degrees of hearing loss where a person often begins to use sign language to communicate. With moderately severe hearing loss a person generally can only hear close, raised voice and a hearing aid may allow some sounds to be heard in quiet situations. However, a child with moderately severe hearing loss often does not have good speech quality and would have trouble developing language skills (Vicdeaf Information Team, 2011). Severe hearing loss is similar to moderately severe hearing loss, but with this degree no conversational sounds can be heard. As with moderately severe hearing loss a child's speech and language and would be greatly affected. Profound hearing loss is the most extreme degree of hearing loss. Hearing aids may or may not help people affected by

this type of hearing loss and developing speech can be extremely difficult for children (Vicdeaf Information Team, 2011)

In addition to degree, hearing loss can also be described in terms of where and how it affects an individual. An individual's hearing loss can be located in only one ear, a unilateral configuration, or both ears, a bilateral configuration. A symmetrical configuration is when each ear suffers from the same degree of hearing loss, while an asymmetrical configuration is when the degree is different for each ear. A progressive configuration occurs when hearing loss is gradual over time and is contrasted by the sudden hearing loss configuration. A progressive hearing loss also includes losing frequencies over time, such as when an individual ages. The final configurations are fluctuating and stable; fluctuating implies the hearing loss degree changes over time, whereas stable implies the hearing loss remains at a constant level (American Speech-Language-Hearing, 2011).

2.1.2 Differing Communication Abilities

Just as each deaf person's hearing ability is different so are their communication abilities. Depending on the type and degree of hearing loss, some may be more adept at using the English language, while some may rely more heavily on their ability to sign. Individuals who are born Deaf learn to communicate in different ways depending on the type of family they are born into. Those who are born into a Deaf family learn sign language at a very young age (Vicdeaf, 2003). Just as young hearing children slowly pick up on speech, so do Deaf children slowly pick up on signs. If a person is born Deaf into a Deaf family often their English skills are learned later on at school or at home, but since they were able to learn signs at a young age they are able to develop their communication skills early on. However, if a Deaf person is born into a hearing family they do not have the as much access to a communication-rich environment. They often get by using gestures or other methods to communicate with family. They learn signing and other communication skills later, resulting in less rapid development of communication (Vicdeaf, 2003).

Those who lose their hearing over time differ from those who are born Deaf into Deaf families in that they learn communication through their ability to hear. However, they are similar in that they have the ability to gain communication skills early on. Since people who lose their hearing over time have already learned written and spoken English they often do not rely heavily on sign language. They generally function with the use of hearing aids and other types of

assistive devices to supplement their hearing loss (Vicdeaf, 2003). Since many deaf individuals have varying communication abilities, the types of technology they use and the ways in which they communicate can be impacted by the different abilities they have.

2.1.3 Deaf Culture

Although hearing loss is what makes a person deaf, often there is much more involved. A difficult concept for the non-deaf to comprehend is that the vast majority of the Deaf community do not consider themselves to be disabled. They consider themselves a community with their own culture, separate from those with the ability to hear, not merely a group of individuals who are grouped together on the basis that they face similar challenges (Tucker, 1997). It is common practice to use "Deaf" with an upper case "D" to refer to individuals who identify with Deaf culture. A lower case "d" includes all those with hearing impairments. When considering assistive technologies for the Deaf and hard of hearing, it is important to understand the culture of the Deaf community and how those social and cultural differences tie into their wants.

In the United States, the Deaf Culture strongly emphasizes social and family ties (Padden, 1991). Deaf communities include the deaf and hearing people who interact on a daily basis with Deaf people and actively support and work to achieve their goals. These communities tend to form as Deaf people relocate to be closer to friends, family or a community where they are understood and accepted (Padden, 1991). Carl Croneberg and colleagues (1974) note that social activities are a key way for maintaining contact within the Deaf community. Through social gatherings, Deaf people gain support and a sense of shared cultural beliefs, which reinforce their desire to remain and identify as a community, rather than a group of people with a disability (Croneberg, Stokoe & Casterline, 1974). The way Deaf communities form is similar to other communities that may share a common race, religion, purpose or ideal. However, the Deaf community is unique because members of this community share a common difference that makes it difficult to integrate with the hearing population and as a result make the bonds within the community much stronger.

In Australia, the Deaf community has many of the same views as in the United States. Many Deaf people interact through Deaf clubs and social groups, which are often supported by non-profit organizations. These organizations provide aid and support for the day-to-day challenges of being deaf in a hearing world (Croneberg et al. 1974).

The primary signing language for the Deaf is Australian Sign Language (Auslan), which is distinct from spoken or written English. Though Auslan is based on British Sign Language (BSL) that was brought to Australia in the nineteenth century, it is its own language that has since grown and developed to fit the communication needs of Australians (Deaf Australia Inc., 2009). It has even developed its own dialects and regional variations in sign pronunciation across Australia (Deaf Children Australia, 2010).

Auslan is distinct from spoken English and has its own grammar, syntax, vocabulary, and word order. It is a language based on what can be seen (Australian Government Department of Education, 2009). In English we would say, "The car is blue"; however, in Auslan the words "car blue" or "blue car" would be signed to convey the same sentence. Past tense is often conveyed by using the Auslan sign for finish, so that the sentence "The woman has seen the man" is signed "woman finish see man" (Deaf Children Australia, 2010).

Just as spelling and word order are vital components to understanding written language, in Auslan, orientation, movement, direction of movement, shape of the hand, and location in space or on the body are vital to understanding the language. For example, a word signed with a certain hand shape can be completely different from that same hand shape signed with a particular movement (Deaf Children Australia, 2010).

2.1.4 Isolation and Barriers

Due to communication barriers, those who are born deaf often associate negative feelings with the hearing world including alienation, oppression, and paternalism (Saladin, 2004). Often, those who are born deaf have substantial difficulty learning written and oral language because this type of language development relies so heavily on hearing words spoken (Nakamura, 2002). This makes even text-based communications difficult, which furthers the divide between the hearing and non-hearing world, and creates a deeper sense of isolation for the Deaf community (Saladin, 2004).

2.2 Vicdeaf

The Victorian Deaf Society, also known as Vicdeaf, was established in 1884. It is a non-profit organization that provides communication and welfare services to the Deaf and hard of hearing within the state of Victoria (Vicdeaf, 2011). One of Vicdeaf's services is to employ persons who are available to the Deaf and hard of hearing to offer advice and guidance on any

matter. They also work with their clients to advise on legal, financial or family issues and they are available for counseling on issues including depression, anxiety and general unhappiness (Vicdeaf, 2011). A division of Vicdeaf, called Hearservice, works more directly with hearing loss management. Through this branch of Vicdeaf the hearing impaired can access hearing assessments, hearing aids and assistive listening devices (Hearservice, 2010).

Another part of Vicdeaf's work is to educate the surrounding general public on the needs of Deaf and hard of hearing population. They offer training programs for organizations and workplaces that either employ or engage with Deaf or hard of hearing people (Vicdeaf, 2011). In addition to these training programs, Vicdeaf offers a variety of different sign language courses for those in both the hearing and non-hearing communities. Some of these courses are specifically geared towards businesses and workplaces that have either deaf clients or employees (Vicdeaf, 2011).

While there are many different technologies that help the deaf communicate, many times communication is facilitated via an interpreter who may or may not use technology. Vicdeaf provides interpreting services for many different situations that involve both deaf and hearing people (Vicdeaf, 2011). There are interpreters available to interpret between Auslan and English, as well as relay interpreters who work to relay Auslan messages between two or more Deaf persons. These relay interpreters do not translate to English and are often Deaf themselves (Vicdeaf, 2011). Vicdeaf also provides note-taking services so that a deaf person can attend an event or meeting and still be able to get the information that was shared (Vicdeaf, 2011).

Interpreters from Vicdeaf interpret in person, but they also use technologies to help facilitate communication without the need to travel to a specific location. A common technology used by interpreters is the computer program Skype, which we will discuss in more detail in a later section (Vicdeaf, 2011). The person or organization that books an interpreter has the choice of whether or not to have interpretation done in person or with the aid of some technology. Now that communication technologies are becoming more advanced, the Deaf and hard of hearing have more options to choose from when it comes to how they want to communicate.

2.3 Available Text-Based Communication

As we have discussed in an earlier section, the deaf community consists of a variety of communication abilities and language skills. For most, written English is a second language, and

many have difficulties understanding the complexities and nuances involved in some writing. However, despite some of these difficulties, some forms of text-based communications are popular among the deaf community. These technologies allow for non-verbal communication which enables a deaf person to communicate with a hearing person who is unable to sign without the need for an interpreter. The technologies also allow them to communicate over distances without having to be face-to-face (Glaser, 2004; Power, 2007). Text communication exists on mobile phones, on computers, and in person through pen and paper. The most common forms of text-based communication technologies include teletypewriters (TTY), Email, and short message service (SMS). This section introduces and explains these technologies.

2.3.1 TTY

TTY, also known as teletypewriters or textphones, are a common form of communication technology that enable Deaf and hard of hearing people to use the telephone system to connect directly to another TTY or to someone who is hearing who does not have a TTY through the use of a relay service.

While there are different types of TTY machines, a basic TTY consists of a keyboard to type one side of the conversation and a screen to read the response (National Relay Service, 2012). Some types of TTY include a handset and can function as a normal phone. This option is most commonly used by people who have lost their hearing later in life and still have strong speech skills because they can speak normally into the handset and be heard and understood, then they can receive a text version of the response (National Relay Service, 2012). It is also a popular type of TTY in families that include both hearing and deaf individuals as it can serve as a TTY or a normal phone (Printacall, 2000). Other types of TTY do not include a handset, but instead provide the user with a printout of the conversation. This option is used by people who are unable to hear and do not use their voice or speak well (National Relay Service, 2012).

TTYs can only call other TTY machines, so in order to make a phone call to someone without a TTY machine, a relay service is used. The relay service available in Australia is the National Relay Service (NRS). The NRS is a government funded service that provides phone service to people with hearing or speech impairments (National Relay Service, 2012). The NRS consists of a call center, which provides the relay service component of the NRS, and an outreach service, which provides information, advice, training and technical support to current and prospective relay service users (National Relay Service, 2012).

The call center is run by the Australian Communication Exchange (ACE) which provides communication products and services to hearing and communication impaired people throughout Australia (Australian Communication Exchange, 2011). There is one call center located in Brisbane which is staffed with relay officers who operate 24 hours a day, every day of the year. When an operator receives a call, he or she types what the hearing person has said for the deaf person, and speaks what the deaf person has typed for the hearing person. The images below show how the relay service works for a person who is deaf and cannot speak as well as for a person who is deaf and is able to speak (National Relay Service, 2012). In addition to TTYs, NRS calls can be made using the Internet or regular landline phones and mobile phones.

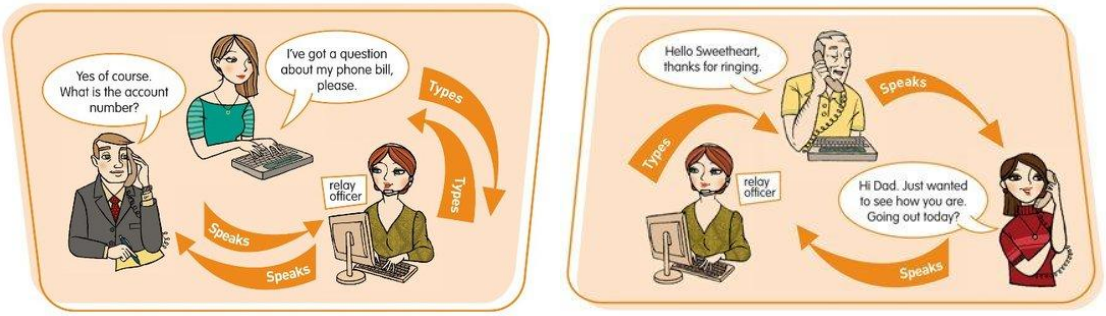

Figure 2 - (Left) Relay for a deaf person who cannot speak well and (Right) relay for a deaf person who is able to speak (National Relay Service, 2012)

2.3.2 Email

Email is a popular form of communication for the deaf because it does not require any special equipment for a deaf person to use it the same way a hearing person would (Power et al., 2007). . Email allows for easy communication between deaf and hearing; however, if the deaf person does not have strong written language skill, longer Emails, with more complex language may be difficult for them to understand (Vicdeaf, 2003).

Email accounts are free to create and maintain so long as a person has access to the Internet. Thus, a deaf person who does not have access to Internet at home, but is able to access Internet at public access sites or at work is able to maintain communication via Email.

2.3.3 Short Message Service (SMS)

SMS is a text-based messaging service that allows users to send text messages from mobile or fixed phones or over the Internet. As with Email, Deaf people around the world have embraced using SMS messaging because it is a technology they can use in the same way that hearing people do without the need for special equipment (Power et al., 2007). In addition, the

rise in popularity of mobile phones allows deaf users to message virtually anyone without the need for a relay service or interpreter.

In 2010, there were nearly 200,000 SMS messages sent every second worldwide, showing that the service has become one of the most common forms of communication around the globe (International Telecommunications Union, 2010). This rise in popularity has encouraged mobile phone companies to design phones around text and Internet based communications rather than the phone capabilities. Phones with full keyboards make is easier to type quickly. Some phone companies in the United States even offer data only service plans which allow the deaf to avoid paying for unusable voice minutes (Business Wire, 2004).

One of the key aspects of SMS is its portability. With a mobile phone SMS provides deaf users access to communication whenever they need it. With this development, many countries are beginning to use SMS-based emergency services. In most of these countries, the extent of the emergency SMS system is to send warnings to the phone in cases of local threats such as natural disasters, terrorist attacks and other serious emergency (Early Warning Network, 2011). These systems are designed to inform everyone, not just the hearing impaired. They allow people to be informed if there is the threat of some emergency that will affect a large number of people, but they do not allow an individual to text in a personal emergency that they require assistance for. However, the United Kingdom has introduced a system for deaf users and users with speech impediments in which registered users can send text messages to the emergency number to request police, ambulance, fire rescue or coastguard emergency assistance as long as they have their mobile phone (EmergencySMS, 2009). New Zealand and Hong Kong have also implemented SMS based emergency communication systems for the deaf (Deaf Australia Inc., 2011; Hong Kong Police Force, 2004). Before the introduction of an SMS based emergency systems in the UK, the deaf had to rely on getting to a TTY machine, using a relay service, or finding and communicating with someone who could call emergency services for them.

2.4 Available Video-Based Communication

In addition to text-based communication, newer technologies now incorporate video streaming and chatting. This section will discuss video-based programs currently available for both deaf and hearing individuals as well as interpreting services that now use video as a means of communication. The use of video for communication allows some Deaf to use Auslan to

communicate instead of written English. Since Auslan is largely based on hand movements and facial expressions, video is able to capture attitudes and meanings that could not normally be conveyed through text.

2.4.1 Video Conferencing Programs

With the advent of higher speed Internet connections, programs have been developed to enable users to communicate with each other in a video conference. Two such programs that exist to enable video conferencing are Skype and Microsoft Lync. These programs allow users to chat with video and sound or through a text based instant messaging system. However it is the video chat capabilities that make the technology a big advantage for the Deaf and the hard of hearing.

Skype, a Voice over Internet Protocol (VoIP) application, is one of the more popular VoIP applications. Skype allows users to register for a free account and then make free calls to other Skype Users. For a fee, they can also call landlines or mobile phones (Skype, 2012). However, it is the video capabilities that appeal the most to the Deaf and the hard of hearing. The video chat capabilities enable them to converse in their first language, Auslan which is both faster and easier to understand. The ability to have a text chat is an option that makes Skype especially versatile. The text can help the hard of hearing by enabling them to still converse and talk in English but if they cannot hear or understand something clearly, then they can resort to the text option. For the Deaf it enables them to use just one account to both communicate in sign language and in text without requiring any additional software or expense. Skype's popularity with over 633 million users also makes it a very appealing option to communicate since so many people utilize it.

Microsoft Lync is a primarily interoffice communication suite developed by Microsoft. Similar to Skype, Lync allows users to use both video and text chat. Lync however, is compatible with other Microsoft Office programs, like Outlook for Email. Lync can also run on office telephones, enabling users to chat on an Internet ready phone with both voice and video, as well as on the computer where they can video chat, instant message, and Email to everyone in their address book (Microsoft Lync, 2011). Lync is especially great in an office environment, since it enables users to search within the office's directory to chat with another employee just by knowing their name. Lync can also be used with personal accounts and is an extension of the Windows Live Messenger, allowing its users to use the program for more than just work

communication. Skype and Microsoft Lync are both very versatile video communication tools, which can be used for both signing and messaging quickly and efficiently.

There are also video-conferencing technologies that do not use a computer or Internet. Videophones use standard telephone lines to stream video to another videophone. Some videophone sets include a standard handset and can be used as a normal telephone, while others consist of just a video screen, a dial pad, and speaker. Because videophones are designed specifically for sending video, the picture quality is typically much better than Skype or other computer-based video technologies. However, videophone consoles can be very expensive. Some of the more expensive models cost several hundreds of dollars (Video Phone Insider, 2010).

2.4.2 Video Relay Interpreting

Video Relay Interpreting (VRI) is a service that gives signing Deaf individuals access to off-site interpreters. Often an interpreter must travel to the Deaf person, but with VRI it is not necessary for the interpreter to be onsite. The Deaf person and interpreter communicate through a video-conferencing program like Skype, where they sign to each other using a video camera and Internet connection. VRI is used prevalently in the United States and United Kingdom, but it has been implemented within the state of Victoria, Australia as well (Department of Human Services, 2011; Gottardi, Shafer & Waterman, 2008).

The VRI services within Victoria are provided in the form of several VRI rooms located around the state. Each of these rooms is equipped with a TV, video camera and high-speed Internet connection. Figure 3 shows how VRI normally works (Department of Human Services, 2011). The interpreter appears on the TV screen from a separate location, where the Deaf and hearing person sit in another one of the VRI rooms. The Deaf person sits so that they can see both the interpreter and the hearing person at the same time, this often means the hearing person will be positioned next to the interpreter and opposite the Deaf person. The arrows display how the flow of communication works. The hearing person speaks to the Deaf person and the interpreter listens and then signs the message for the Deaf individual. The Deaf person responds using sign language and the interpreter watches and then relays the message to the hearing person using their voice (Department of Human Services, 2011).

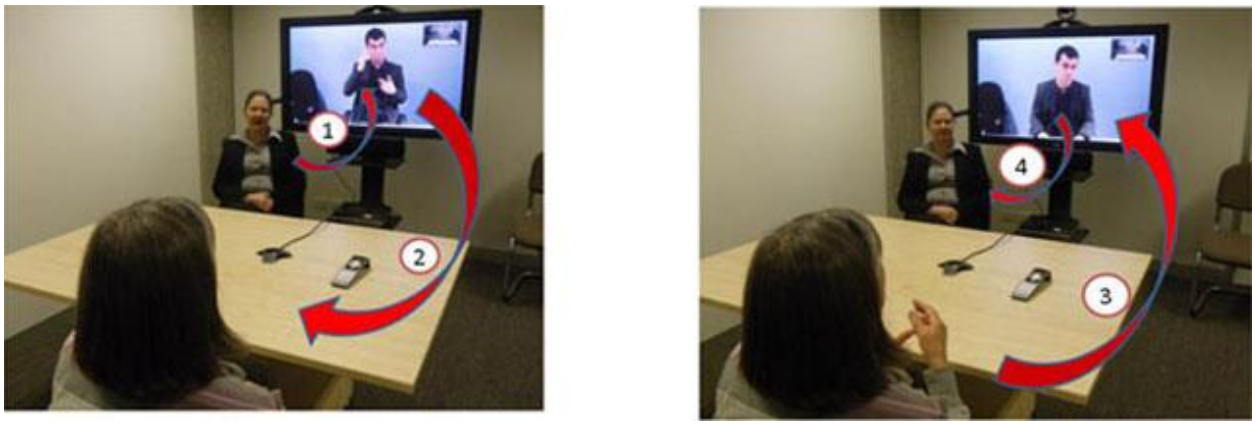

Figure 3 - The VRI process (Department of Human Services, 2011)

Although Figure 3 shows a common VRI process, interpretation can also be done with different configurations of people. In some instances the relay interpreter and the hearing person are present in the same room, while the Deaf person is offsite at another location. Similarly, a Deaf person and an interpreter can be present in the same room, while a hearing person sits at a separate location (Department of Human Services, 2011). Regardless of how it is conducted, VRI provides a way for signing Deaf individuals to communicate using their preferred language and allows for an easier sharing of information between the hearing and deaf.

2.5 Upcoming Communication Technologies

As time progresses, technology is always improving, advancing, and evolving to better suit the needs of the users. This section discusses recent advancements in technology that have been specifically designed for the deaf as well as technologies that have been adapted by the deaf to fit their communication needs.

2.5.1 Smartphones and Smartphone Applications

Smartphones have taken off as some of the most popular mobile phones on the market, and this is especially true with the Deaf community, who are often early adopters of technologies (Christensen, 2011). Smartphones have various applications (apps) that are available, with more and more becoming available as time goes on. Smartphones can also connect to the Internet to enable more advanced telecommunications and features. It is these features that make smartphones appealing to the mass market, the deaf included (Christensen, 2011). Facetime, an app developed by Apple Inc. for the iPhone, utilizes a front facing camera in order to allow video calling between iPhones, iPads, iPod Touches and Apple computers. Facetime has become a popular novelty for most users; however the Deaf community often use this app to have

conversations in sign language without having to resort to SMS (Robitaille, 2010). Other mobile video apps exist, like Skype Mobile, which enable cross platform video conferences.

Another option is Tango. Tango is an app available for smartphones which allows for video calls over mobile Internet, as well as wireless Internet. Tango is growing in popularity due to its clarity and its ability to be used anywhere on multiple devices (Tango, 2012). However, video apps do have limitations for the Deaf including a lack of a front facing cameras on many current mobile phones. Many apps also rely on a wireless Internet connection in order to complete the call, and many data plans have limits reducing the amount of usage some apps receive.

There are also several other apps which the deaf community can utilize on their mobile devices. One such app is "iASL", which can translate English sentences into American Sign Language (Going Mobile, 2011). With this App, a person who does not know sign language will be able to communicate main ideas to a Deaf individual. Apps like "Purple VRI" enable a Deaf person to initiate and utilize VRI from a mobile device without having to travel to a pre-determined VRI location (Purple Communications, 2012). Finally, most smartphones will come with a notepad or other means of enabling a user to write a message on the device. If necessary this notepad can be used to share main points of information between a hearing and deaf individual.

2.5.2 MobileASL

MobileASL is a new technology that is being developed to enable sign language over cell phones without the need for wireless Internet. This technology will not require as much data or bandwidth as Facetime or other similar applications (Kim et al., 2011). Mobile ASL is being developed at the University of Washington and recently finished a field test in the summer of 2010. MobileASL can be used over a typical 3G cell phone network without wireless, because the program does not transmit sound and focuses mainly on a person's hands and face. The program will also reduce the amount of detail put into the background, thus minimizing the data even further.

2.5.3 Signing Avatars

Another promising upcoming technology that will enable computer interpretation is signing avatars. A signing avatar is a computer representation of a person that can communicate

through sign language and have the capability of interacting with the user, allowing for repeat translations or variable signing speed. Signing avatars can also increase the usability of the web for the Deaf community. A Deaf individual will often have a hard time understanding complex English, and if an avatar is coded onto a website, the program can sign what has been written on the page. This will allow Deaf visitors to see the information on the webpage in their native language and therefore will be able to understand the information at a faster pace (Power & Power, 2010).

Signing avatars are can be used to interpret for online videos without captions, or television shows or movies when watched on a computer (Power & Power, 2010). As an educational tool, signing avatars can be used to teach sign language in a full 3D space, which is vital to understanding the language. A user could also speak into a microphone or type into a program and have the avatar interpret and sign the message.

Some signing avatars have started to become available to help aid Deaf populations. In Britain, TESSA, the Text and Sign Support Assistant, has been implemented at Post Offices to facilitate communication between the employee and a Deaf customer. The assistant speaks into a computer and it is interpreted into British Sign Language and English for the customer to read (VisiCAST, 2012). TESSA was developed as a part of the ViSiCAST project which set out to improve the quality of life for the Deaf and hard of hearing in all of Europe (VisiCAST, 2012).

2.6 National Broadband Network

Many of the available and upcoming technologies discussed in this chapter rely on access to the Internet. Without Internet, these technologies would be of no use to anyone, especially not to the deaf. In this section we will introduce a project that is currently underway to provide all of Australia with Internet access. Although this project was not designed solely for the benefit of the Deaf and hard of hearing, it will help provide them with more communication options. The Internet has the ability to connect people across the globe, and for the deaf having that connection will make communicating in a hearing world, much easier.

2.6.1 About the National Broadband Network

The National Broadband Network (NBN) is an initiative facilitated by the Australian Government to provide Internet access to all of Australia (Department of Broadband, Communications and the Digital Economy, 2011). Homes, schools and businesses are all

included in the project and most of these establishments (93%) will be connected via a fiber-optic network. This network has high-speed capabilities with download speeds of up to 1 gigabit/second. The remaining 7% of Australia will be given access to the Internet via fixed-wireless or satellite connections, which have a download speed of up to 12 megabits/second (Mbps) (Department of Broadband, Communications and the Digital Economy, 2011). Currently it can take up to a day to download a compressed movie at speeds of 56 kilobits/second (kbps), but at 12 Mbps the same movie can be downloaded in about 11 minutes. With 100 Mbps (around 1 gigabit/second) it will only take about a minute (Department of Broadband, Communications and the Digital Economy, 2011). The NBN not only provides high quality Internet, it also provides it to all of Australia, making it that much easier to stay connected and communicate.

Initial processes for the implementation of the NBN are already underway. On October 18, 2011 NBN Co., the company responsible for construction of the National Broadband Network, released a twelve-month plan to extend the fiber-optic network to 49 towns, which is double the 24 towns that already had access to this network prior to the release of the plan (Department of Broadband, Communications and the Digital Economy, 2011; NBN Co, 2010). The work will begin on this fiber network some time before September of 2012 and within that same year, NBN Co. will release a 3 year plan to extend this network further (Department of Broadband, Communications and the Digital Economy, 2011). This 3 year plan will be updated each year until the project is complete.

The fixed wireless network will provide Internet access to the more rural and less densely populated areas of Australia. The first communities to receive this network will be the surrounding areas of Ballarat (Victoria), Darwin (Northern Territories), Geraldton (Western Australia), Tamworth (New South Wales) and Toowoomba (Queensland) (Department of Broadband, Communications and the Digital Economy, 2011). The construction of this network was started in December 2011 and the people within those communities will have access to Internet services in the middle of 2012. NBN Co. is planning to complete the rollout of fixed-wireless by 2015. Although the download and upload speeds of this wireless network are slower than that of the fiber-optic network, it will still provide parts of rural Australia with the option of quality Internet (Department of Broadband, Communications and the Digital Economy, 2011).

Satellite services are also part of the NBN plan. An Interim Satellite Service (ISS) was put into place in July of 2011, providing some residents of rural Australia with immediate

Internet access. The ISS was an immediate solution for those who currently did not have any access to the Internet. A more permanent satellite solution will be put into place in 2015 (Department of Broadband, Communications and the Digital Economy, 2011).

The three options discussed above will eventually allow all of Australia to access the Internet. However, in order to actually use the Internet, individual households and business must purchase the service from a service provider. There are over 20 providers available within currently active Internet sites and there are 7 satellite Internet providers available as well. Although some of these services providers are only available in certain areas, consumers will still have multiple options to choose from (NBN Co, 2012).

2.6.2 NBN and the Deaf

There are many available and upcoming technologies that help facilitate communication. We have provided information on TTY, Email, SMS, Skype, Microsoft Lync, VRI, smartphones, smartphone applications, MobileASL and Signing Avatars. Many of those technologies either require the use of the Internet, or can be used with the Internet for communication purposes. The technologies that do use Internet are also some of the newer forms of communication. For example, Skype and Microsoft Lync are relatively new forms of technology when compared to something like TTY.

As technology advances more and more, the Internet becomes a viable way to connect people because it can be accessed around the world. Through the Internet people are easily able to send text and video across the globe, something that can be of great help to the deaf. Since the deaf often times cannot just pick up the phone and call someone, having the ability to quickly send a message or to use video to have a signing conversation with someone, can be a convenient way for the deaf to communicate. The National Broadband Network can help provide the deaf community with better access to these more convenient forms of communication. The speeds produced by the NBN will also allow for better streaming of information, making it easier to use video communications such as Skype and Microsoft Lync. There are many people who can benefit from the NBN, but for the deaf it is not just about having access to the different perks the Internet can offer. The Internet can be a vital means of communication that help the deaf live their day-to-day lives just as a hearing person would.

2.7 Preferences and Constraints in Communication Technologies

We have discussed specific technologies, both text-based and video-based, used by the deaf in the previous sections; however, we now shift the focus to some of the preferences and constraints found with these different technologies.

Three text-based communications that are frequently used by the Deaf and hard of hearing are TTY, Email and SMS (Pilling & Barrett, 2008). Each technology is used in varying degrees by different groups of the hearing impaired and each has benefits and drawbacks. We will discuss information our team has gathered from different countries around the world about which of these technologies are used more frequently and why. We will also provide information regarding some of the drawbacks of these technologies.

We have also discussed in previous sections video-based technologies that are now available and that have been embraced by the deaf for communication purposes. Since these technologies are more recent than the text-based communications, there is not as much information available on the preferences in these technologies. However, in this section we will discuss why these technologies benefit the deaf community as well as some of the issues that are present in these newer forms of technology.

2.7.1 TTY

Of the wide range of available communication technologies, TTY is used slightly less often than other forms of technology; however, it is still common among some of the Deaf and hard of hearing community (Pilling & Barrett, 2008). A survey conducted in the United Kingdom among hearing impaired individuals found that of those surveyed, 53% used TTY. Although over half the people surveyed use TTY, it was only the preferred technology for the 70+ age group. The survey indicated that familiarity with TTY and its wide availability were the main reasons it was preferred (Pilling & Barrett, 2008).

A wide spread availability of TTY was also apparent in a similar survey conducted in Australia. In this study 89% of respondents had access to TTY at either home or work and were currently using the technology. Although this survey did not specify data about TTY usage by age, it did indicate that the use of TTY was beneficial when longer communication was required, such as for business (Power et al., 2007). Although TTY may not be as popular as some other forms of communication technology, some members of the Deaf and hard of hearing community may still prefer to use it on certain occasions.

Although TTY may be good for business or other longer communication purposes, it is an older technology that is quickly falling out of use today, especially with younger generations as more efficient and easily accessed technologies are being developed (Job Access, 2011). One

main constraints of TTY is that it requires special equipment, and that equipment is not portable (Power et al, 2007). TTYs are not mobile, so that if a deaf person needs to get in touch with someone, they have to get to their TTY machine. In some cases this means delaying making the call for several hours.

Another constraint for TTY machines is that if you want to contact anyone who does not have a TTY machine, a relay service is required (National Relay Service, 2012). Waiting for the operator to relay everything that has been said and to type what the response can take time and be frustrating (Power et al., 2007).

One of the main constraints of TTY is that only one person can "talk" at a time. With newer technologies like SMS or instant messaging, you can be typing and sending a message at the same point as your conversation partner. However, with TTY, if you tried typing or sending a message at the same time the signals would get crossed and the messages would be received as jumbled letters (Job Access, 2011). Therefore, when using TTY it is necessary to wait to receive the message from your conversation partner before responding. This leads to longer, more drawn-out conversations, with pauses while you wait for the other party to type and send their message.

2.7.2 Email

Email seems to be widely used as a form of communication by the Deaf and hard of hearing. The Australian study showed that 91% of those surveyed were using Email, while the study conducted in the UK found a slightly lower, but still significant 74% (Pilling & Barrett, 2008; Power et al., 2007). A German study similar to the Australian and UK studies found that 72% of those who used computers to communicate sent and received Emails from that computer (Rehling, Power & Power, 2007). Since such a large number of Deaf and hard of hearing populations are using Email as a means of communication, it is apparent that there are some major benefits to the technology. Using Email is relatively simple and inexpensive. Those sending the Email are able to include as much text as they want and the ability to send attachments along with their message can be very useful for both social and professional communication (Pilling & Barrett, 2008).

However, one of the major drawbacks to Email is that it requires access to a computer or Smartphone with Internet service. This is true for many different communication technologies,

especially video-based ones which will be discussed later on in this section. If a person does have Internet access they also have the ability to use other forms of communication such as web pages, social networking sites and chat rooms (Power et al., 2007). Someone without Internet access at home can still have an Email account, using public Internet access points to check their Email and stay in touch, but this brings up another drawback of the technology in that it is not as instantaneous as something like SMS. If a person does not have Internet access at home, they will not be able to check their Email very often. However, even if a person does have regular Internet access, they may leave their computer for one reason or another and will not be able to respond until they return. Although Email is very beneficial when a large amount of text needs to be sent, it may not be the best option if an instantaneous conversation is desired.

2.7.3 SMS

The use of SMS to send text messages from mobile phones is a technology that has been widely embraced by the Deaf and hard of hearing community. Mobile phones have become increasingly smaller, making the use of SMS much more convenient and portable (Pilling & Barrett, 2008). A large fraction of the population (both hearing and non-hearing) use mobile phones. By using SMS the hearing impaired can very easily contact both a hearing person and another Deaf or hard of hearing person. In a survey conducted in the United Kingdom when asked which technology they preferred, the majority of deaf individuals chose SMS (Pilling & Barrett, 2008). When the results of the survey were broken into age groups, SMS was the preferred choice in the three youngest age groups (ages ranging from 15-49), while the oldest two age groups (ages ranging from 50-70+) more often chose other forms of technology (Pilling & Barrett, 2008). Table 2 displays the breakdown in percentages for each of these age groups (Pilling & Barrett, 2008).

Table 2 - Preferences in Text-Based Communication (Adapted from: Pilling & Barret, 2008)

Age Range	SMS %	Email %	TTY %
15-18	64	12	0
19-29	74	17	4
30-49	53	32	2
50-69	27	44	11
70+	13	25	27
All ages	35	32	12

Although not specific to SMS, older respondents indicated more often that they did not know how to use certain technologies. This may be a possible explanation for why a newer technology, like SMS, is more popular in younger age groups.

Some of the major reasons given in this survey for choosing SMS were that it was easy to use and could be used anywhere there is signal. Even though laptops have made computers more portable, the size of a laptop does not compare to the small size and portability of a mobile telephone. Its convenient and portable design makes SMS on mobile phones a very favorable choice for the Deaf and hard of hearing.

In Australia, SMS is as popular and as widely used as it is in other places around the world (Power et al., 2007). A survey conducted in Australia found that 94% of the Deaf and hard of hearing were using SMS, which had the highest percentage of usage of any form of communication technology (Power et al., 2007). The respondents to this survey in Australia had much of the same things to say about SMS as those in the UK survey. SMS is a convenient form of communication and is used by many for multiple different purposes. The technology has made it easy for both hearing and non-hearing people to stay in contact with friends, family, and business associates, as well as use the features of the mobile phone for emergency services, weather forecasts and entertainment (Power et al., 2007).

Just as Email is beneficial for long conversations, SMS may be more useful when only a small amount of text needs to be sent at time. SMS messages typically have a character limit per message, which makes it difficult to carry-on longer, more in-depth discussion (Power et al., 2007). Whether SMS is used for business or personal reasons the technology is usually reserved for short, back and forth communication. Just as a hearing person may prefer to call someone for a more in-depth discussion, the deaf may prefer to use other forms of communication that allow them to send longer more descriptive messages.

In the above subsections, we have discussed three different types of text-based communication. Each of these technologies has its own benefits and drawbacks, but they all share one major constraint that is true for all forms of text-based communication, which is the inability to read and write. Because the development of language relies so heavily on hearing it spoken, those who are born deaf are at a significant disadvantage and often have much difficulty learning to read and write (Nakamura, 2002). If a deaf person has difficulty reading and writing, than using text-based technologies, such as TTY, Email, and SMS messaging can prove to be

just as difficult as trying to communicate without the assistive technology (Saladin, 2004).

2.7.4 Video Conferencing Technologies

Although video-based communication technologies have become increasingly popular among the deaf, because they are more recent advancements in technology, there is not as much published material about the preferences for these technologies. As we have discussed previously, these forms of technology allow the deaf to communicate without the need to read and write, which may be helpful to a Deaf person who is not proficient in these skills. This may make communication more convenient for both the conversing parties and the interpreter. Part of our research in Australia will be geared towards gaining more information about video-based communication and the specific benefits that deaf individuals have found while using these technologies.

Technologies that involve video streaming, like Skype and Microsoft Lync, are similar to Email in that they rely on access to Internet; however, in addition to this they also require a broadband connection with a strong signal. A weak signal or not enough bandwidth can cause breaks and lags in the video stream, which distorts and interrupts the picture. Sign language relies heavily on being able to follow specific hand movement and on the facial expressions of the signer (AT&T, 2004). When the picture gets interrupted it is impossible to follow the conversation, and makes the technology essentially useless. Webcams also play a significant role in picture quality for video-chatting technologies. Factors such as field of view, resolution, frame rate (how quickly the camera can capture and move video to the computer), and the size of the computer screen, all contribute to the quality of the picture and can affect the ease of communication.

2.7.5 VRI

As with video-conferencing technologies, since VRI is a relatively new service, there is not much information on the pros and cons deaf people have found in its implementation. Since VRI services also allow for interpreters to relay messages between Deaf and non-deaf parties, the language barrier between Auslan and English is bridged (Power et al., 2007). VRI can be used by Deaf individuals in many different situations and research has found that it can have major benefits in medical and other professional appointments. Specifically, during medical appointments, when professional interpreting is not used there is a higher risk of a mistaken

diagnosis, the deaf person may not receive the proper quality of care, prescription mistakes can occur and there may be an increase in invasive procedures (Vicdeaf, 2007). VRI can be a solution to some of these problems because by using video, the interpreter does not have to travel to the location of the appointment, saving both time and money.

VRI can be beneficial when implemented properly. However, there are very few VRI stations actually available for the deaf to use. Within Victoria there are only 11 VRI rooms available; 3 are located in the metropolitan region, while the remaining 8 are located in the rural parts of Victoria (Department of Human Services, 2011). Figure 4 shows a map of these different locations. The marker located in Melbourne represents the three VRI locations that are located within the metropolitan area. Because there are so few VRI locations available, if a deaf person does not live near one of the rooms, it may be a hassle to go to one of these locations for interpretation. Using video conferencing programs like Skype and Lync to chat with another deaf person can be very helpful, but when interpretation is needed, video is not as portable because the deaf individual must travel to one of these rooms. The benefits and drawbacks we discussed for VRI and video-conferencing programs were found through our background research. Prior to completion of this project there was no direct information about the preferences of the Victorian deaf community itself. The surveys and interviews we conducted helped fill this gap in information.

Figure 4 - Map of VRI Room Locations (adapted from: Department of Human Services, 2011)

Although there was a lot of information about the different technologies that are available around the world, there was not information regarding what is available and being used specifically in the state of Victoria. Our team gained specific information regarding communication technologies from deaf Victorians themselves. We used similar questions and formatting that the studies presented in this chapter used, in the hopes that these types of questions would provide us with valuable information regarding preferences and constraints in communication technologies. In Table 3, we have provided a summary of the technologies discussed in this section and the advantages and disadvantages that those technologies seem to have. As we narrowed our focus to the communication technologies in Victoria, we investigated whether the deaf population there found the same benefits and drawbacks. We also investigated whether there were any constraints or preferences that were specific to the state of Victoria.

Table 3 - Advantages and Disadvantages of Communication Technologies

Technology	Advantages	Disadvantages
TTY	Widely available, good for longer communication	Messages may become jumbled, only one person can send message at a time
Email	Easy to use, inexpensive, can send a lot of text at once, attachments	Requires Internet access, not an instantaneous conversation
SMS	Instantaneous, easy to use, convenient, portable	Cannot send as much text, hard to have long in-depth conversations
Video Conferencing Technology (Skype, Lync, etc.)	Do not need to read and write well, can use preferred language	Require good quality Internet and good picture quality, images can become distorted and make communication impossible
VRI	Interpreter does not need to be onsite, can lead to less miscommunication	Is not portable, there are not many locations throughout Victoria

3 METHODOLOGY

Communication is a component of everyday life and essential to completing many ordinary tasks and chores. The Deaf and hard of hearing have the extra challenge of having to communicate silently in a hearing world, however, there are many technologies that can make such communication easier. The goal for our project was to help determine the optimal communication technologies for the Deaf and hard of hearing community in Victoria, Australia through surveys, interviews, focus groups and research into different types of technology, and to advise Vicdeaf on the best way of providing the optimal technologies to their clients. Our objectives to accomplish this goal were:

1. Determine which technologies people have access to
2. Determine which technologies are most commonly used
3. Identify the preferences of the Deaf and hard of hearing in relation to communication technology
4. Identify the constraints regarding the use of different technologies
5. Evaluate each technology for the preferences and constraints identified
6. Provide recommendations on the most suitable technologies as well as possible implementations of these different technologies.

Our last two objectives depended on the completion of the first four objectives. We could not evaluate the different technologies until we had identified which technologies were available, being used, and the preferences and constraints associated with each technology. Once we evaluated the technologies, we were able to complete our goal of providing recommendations to Vicdeaf in regards to the most effective available and upcoming technologies and how to best implement the different technologies.

The first four objectives were completed simultaneously using a survey as well as conducting interviews and a focus group. The questions for each can be found in Appendices A and B. These questions addressed objectives 1-4, regarding availability, use, preferences and constraints associated with different communication technologies. We would like to note that there is a difference between the “use” of technologies and the “preferences” for technologies.

"Use" includes all technologies that the Deaf and hard of hearing actually use, while "preference" include the technologies that they like using. People may use something that they do not necessarily prefer, and they might prefer something that they are unable to use.

Due to the difficulties many deaf people face learning written English, our survey and focus group questions had to be edited and simplified into more basic language in order to avoid confusion. We also included an introduction to our survey, explaining who we were and what the goal of our project was. We had this introduction translated into Auslan in order to make it more easily understood. All of our interviews and focus groups were conducted with the help of interpreters so that all of the participants understood the purpose of the meetings and the questions that were being asked.

3.1 Available Technology

The first step in completing our project's mission was to determine which communication technologies were available to the Deaf and hard of hearing. Although this objective was completed in conjunction with objectives 2, 3 and 4, it was a major part of our project in that it was the starting point of our data collection. We first determined which communication technologies were used elsewhere in the world and then determined which technologies were specifically available in Victoria.

3.1.1 Available Technology around the World

In order to determine which technologies are available elsewhere in the world our group performed background research on previously conducted studies. The information we obtained from these studies was presented in Chapter 2. Not only did the information give us an idea of what is being used for communication elsewhere in the world, it also helped us develop a list of current technologies that we used when conducting our surveys and interviews in Victoria.

During our background research we also came across some upcoming technologies that were being developed elsewhere in the world. We included questions that addressed signing avatars and Microsoft Lync in order to gain information about technologies we believed were not widely used in Victoria. The purpose of including these questions was to determine if people did not use these technologies because of a lack of knowledge, or for some other reason. By starting with available technologies elsewhere we were able to come up with a starting point from which to build the rest of our survey and interview questions.

3.1.2 Available Technology in Victoria

In the surveys and interviews our group conducted, we asked questions specifically geared towards determining the availability of technologies in Victoria. A main component of determining availability of current technologies, and later on the viability of upcoming technologies, was how much access deaf individuals had to the Internet. Since many newer technologies require Internet access, we included questions about the Internet in both our surveys and interviews. In these questions we include the subject of Internet access through a mobile device, like a phone.

In addition to asking about Internet access we also provided questions concerning the list of technologies we had come up with from our background research. The purpose of this was to determine out of those technologies, which were actually available in Victoria. Figure 5 below is a question from our online survey that was distributed to members of the deaf community in Victoria. The figure displays the list of technologies our team compiled. In this specific question we asked our respondents to select all of the technologies they currently had access to. This question allowed us to determine which technologies are more available within Victoria as compared to the rest of the world.

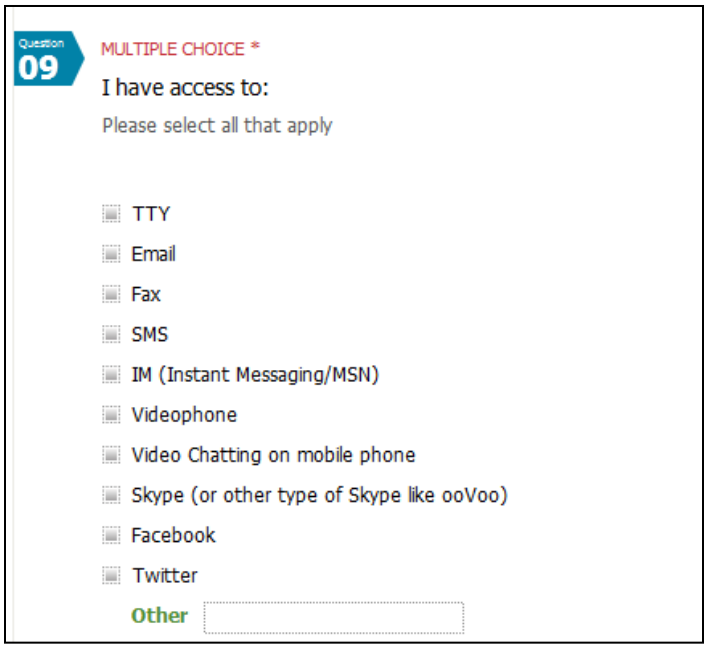

Figure 5 - Survey Question: Available Technologies

3.2 Use of Current Technologies

Our next objective was to identify the current technologies that are used by the Deaf and hard of hearing in Victoria. As we discussed in the introduction to this chapter "use" is different than "preference". We identified the different technologies that were being used in order to identify trends in the usage of these technologies. All of the survey, interview and focus group questions that were asked can be found in Appendices A and B.

3.2.1 Most Commonly Used Technologies

In the previous section we discussed our methods in determining the availability of different technologies. The next step was to then determine of those available technologies, which were most commonly used. In our survey, we asked respondents to identify which technologies they used and how often, providing options such as daily, weekly, monthly and every few months. We also provided an option of "I do not use this technology".

3.2.2 Reasons Why

Our team also included questions on the survey that asked respondents to identify the reasons why they do or do not use certain technologies. We provided the following options on our survey for the possible reasons someone could have for using a technology.

- I have it
- It is cheap
- It is easy to use

We used these reasons when addressing the list of technologies we developed from our background research. The respondents had the ability to check multiple answers in case they used a technology for more than one reason.

In addition to the list of possible technologies, we included specific questions about VRI. Since VRI was implemented relatively recently in Victoria we wanted to determine what the perception of this technology was amongst the deaf community. We first asked whether or not the respondent used VRI and then asked them to explain why they did or did not use the technology. By allowing respondents to write in their own answers for why they did or did not use VRI, our team was able to gain information about various reasons for use or disuse that we would not have thought of on our own. We were able to go deeper into the pros and cons of VRI in our focus group.

In our focus group, we were able to gain more specific information regarding the use of different technologies. We asked people to describe specific ways in which they used different technologies to communicate. We also asked them about the technologies they used most often and why, which allowed us to obtain qualitative data as to why technologies were being used.

3.3 Technology Preferences

In order to determine which technologies best fit the wants and needs of the deaf community in Victoria, it was important to establish what technologies they would prefer to use. Some of these technologies they may not have access to, but they may prefer certain aspects of the technology, such as ease of use, mobility, cost, etc.

3.3.1 Favorite Technology

One question, taken from a previous survey done in the UK asked, "If you could have one form of text communication what would it be?" (Pilling & Barrett, 2008). Our survey asked a similar question, which listed different forms of text, video and Internet-based communication technologies, as well as an "other" option in case respondents had a preference we did not include. This question was important for identifying preference, because it allowed us to determine the most favorable technologies among the sample. We could then determine what aspects of those technologies made them favorable. .

3.3.2 Reasons for Preference

Participants were asked to explain what about their favorite technology made it their favorite. This helped determine which existing technologies were most preferred and why. Another question asked respondents to identify the three most important aspects of technology including cost, ease of use, mobility, video capability, etc. This question allowed us to identify certain aspects of technologies that were important for the deaf to have in a technology. We used this information for our last objectives when evaluating the different technologies and providing recommendations. We also asked them to identify if they use each technology for business or personal use to see if some technologies are preferred for specific situations. Additionally, the survey included questions pertaining to why each technology was not used. The responses to this question allowed us to determine the perceived negative aspects of each of the technologies we

were looking into. Enabling our team to know what draw backs or limitations should not be in technologies that we presented to Vicdeaf in our recommendations.

3.4 Technology Constraints

In addition to knowing why people prefer some technologies over others, we identified what people did not like or did not want in a technology. The purpose of this was to determine if some of these negative attributes could be avoided or fixed as much as possible in the implementation of new technologies. The determination of constraints for our list of technologies also helped guide us to certain upcoming technologies that might benefit the Victorian deaf community.

In our survey we asked people to identify why they chose not to use the technologies they did not use. We provided options such as “too expensive”, “I do not have it”, “not easy to use”, and “I do not know what it is”. During our interviews, we were able to ask more specific and complex questions that gave us more detail as to what specifically caused the technologies to be unfavorable.

3.5 Evaluation of Technologies

After we had conducted our survey and focus group, we used the data describing both preferences and constraints to identify criteria for evaluating which existing technologies were the most beneficial. We further used these criteria to determine if there were any new or upcoming technologies that would better fit the demands of the population. We also asked questions on our survey that dealt with demographics to determine if certain groups of the population prefer certain types of technology.

3.5.1 Demographic Information

In order to better analyze our data, the first part of our survey dealt with determining different demographic information about the respondents. The first seven questions dealt with topics such as gender, first language, age, income, location, etc. The ranges we used for age we based off of previous surveys we found during background research, while the ranges for income were based on the tax brackets used by the Australian Taxation Office (2011).

This information helped us determine whether or not certain groups of the population preferred certain types of technology. Prior to completion of this project we were unsure as to

whether certain groups knew more about the different technologies or whether some groups had better access to technology. By using different demographic information we were able to group the data and analyze the responses we received from these different groups.

3.5.2 Evaluation Criteria

The criteria we came up with were based on the data we collected in our survey and focus group. We identified the most preferred technology and the reasons why, as well as the most important aspects of a technology, and what people did not want, or did not care about, in their technologies. Using all of this information, we examined each of the technologies to see if they met any of the standards we identified.

We determined the survey results were statistically significant because in the results, each gender, language, age group, income bracket, hearing loss age group and region of Victoria was represented. Using these results we were able to determine which aspects and types of technology were important to the Victorian deaf population. Once we determined the important aspects of technology we were able to develop recommendations to give to Vicdeaf regarding which technologies seem to best serve deaf Victorians as well as possible implementation techniques for these different technologies.

3.6 Recommendations and Implementation

We developed recommendations and a means of implementation so that our results would be both effective and useful. These recommendations provided a way for Vicdeaf to use our survey responses and our analysis quickly.

To develop the recommendations, we began with all of the data collected from our surveys, interviews, and focus group. Our team compiled the results and created a summary that we used to determine the preferred technologies and the aspects of these technologies that were most important to the deaf community. We compared our findings to the technologies we identified from our background research and then determined the technologies that we believed would benefit the deaf community of Victoria the most.

After evaluating the technologies, our team developed a plan of how to implement the most favorable technologies. We selected from a variety of options including education, advertisements, and purchasing or subsidizing technologies for the community. We looked at how other programs Vicdeaf has run in the past worked as well as how other organizations have

reached out to their communities to provide education and advertisement. To get the technology out to as many people as possible, we also provided a few ways of obtaining the technology that Vicdeaf could use to distribute the technology or inform their clientele of where to acquire it.

4 FINDINGS

As we discussed in our Methodology chapter, we gathered information by surveying and interviewing members of the Victorian deaf community. The population we were interested in consisted of the deaf individuals across the state of Victoria ranging in age from 15 to 70+ and located in both metropolitan and regional areas of the state. We reached a total of 114 people with our survey and held a focus group with five Deaf individuals. In the following sections we present the data gathered from those methods as well as the importance of these data. We first discuss demographic information and describe which parts of the population we reached and to what extent. Although this information is directly related to types of communication technology it also helps show the significance of the data we gathered. In this chapter we will also discuss evidence for which technologies are available in Victoria as well as which of those technologies seem to be most commonly used by deaf Victorians. The last section of this chapter will be dedicated to the evidence we gathered about the preferences and constraints of the Victorian deaf community. These preferences and constraints were instrumental in the development of our recommendations, which will be discussed in the next chapter.

4.1 Demographics

In this section we provide the demographic information for our survey only. Since we reached many more people with the survey than we did with our focus group, we recorded information regarding respondents' gender, age, first language, income, location and age at which hearing was lost. Not only does this information allow us to filter the data based on different categories, it also allows us to evaluate how successful our survey was. This section will focus specifically on the respondents' answers to the demographic questions; whereas the analysis of the data based on the different groups will be presented in the later sections of this chapter as evidence of different availability, use and preference.

4.1.1 Gender

Our survey reached a total of 114 people. We received more responses from female Victorians than we did male Victorians; however, this is not inconsistent from the surveys we studied for our background research (Pilling & Barrett, 2008). Even though there were more female respondents, there were still a significant number of male respondents. Out of the 114

responses, 69 were women and 45 were men, resulting in a distribution of 61% women and 39% men. Although we will not speculate as to why more women responded to the survey than men, the difference in percentage does correspond to the slightly higher population of women in Victoria. Of the total population of the state, 51% are women and 49% are men (Australian Bureau of Statistics, 2012). The difference in our distribution is much higher than that of the total population; however we do not know the number of women that received the survey verses the number of men. Since we were able to reach a significant number of both men and women, it is reasonable to assume that this difference is negligible.

4.1.2 First Language

There was a relatively even split between the first language of respondents. On our survey the choices we gave were English and Auslan, as well as an "other" option where respondents could write in an answer. The distribution between English and Auslan was about 53% to 45%, with the slight majority choosing English as their first language. There were three respondents who chose the "other" option. These three respondents indicated their first languages to be Cantonese, Total Communication, and New Zealand Sign Language. Total Communication is an approach to communication that teaches deaf children to use different methods of communication at the same time. For example sign language is used in addition to other oral methods of communication (Aussie Deaf Kids, 2008). The last respondent indicated he or she was bilingual in both New Zealand Sign Language and English.

4.1.3 Age

An important part of our survey was the age of the respondents. We were able to obtain data from each age range, insuring that all ages of the population we studied were represented. The breakdown of the ages is represented in Figure 6 below. The majority of the respondents were between the ages of 50-69; while the oldest and youngest age groups (15-19 and

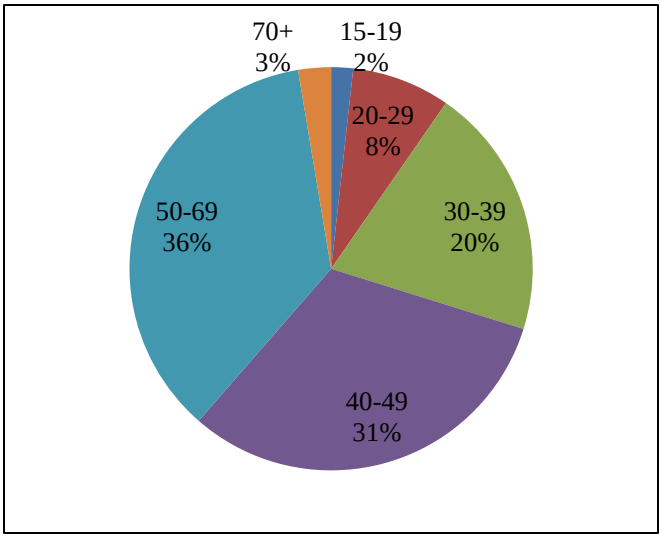

Figure 6 – Number of Responses by Age Group

70+) were the least represented. Having data for all of these age groups allowed us to analyze the data based on age. If we only had data for some of these groups, we would not be able to draw conclusions about the entire population and would have to speculate as to technology usage across the age ranges.

4.1.4 Income

As with the age range category, we were also able to gather data from individuals who represent each of the tax brackets used in Australia (Australian Taxation Office, 2011). Although we were able to obtain data for all of the tax brackets, the majority of respondents make less than $37,000 or between $37,000 and $80,000. Table 3 below illustrates the data we received.

Table 3 - Tax Bracket Data

Tax Bracket	Number of Respondents	% of Total Respondents
Less than $37,000	40	35%
Between $37,001 and $80,000	47	41%
Between $80,001 and $180,000	7	6%
Above $180,001	1	1%
I prefer not to answer	19	17%

4.1.5 Location

The types of technologies and services the deaf have access to is largely dependent on where each individual lives. We attempted to reach members of the deaf community throughout the state of Victoria and although we reached much of the state, the majority of respondents were located in and around Melbourne. Figure 7 below shows the distribution of responses we received. Our results are an accurate representation of the overall population because about 73% of the Victorian population lives in Melbourne (Australian Bureau of Statistics, 2012). We were also able to reach respondents in the regional parts of Victoria and as a result, were able to develop separate recommendations addressing the different needs that the regional deaf have.

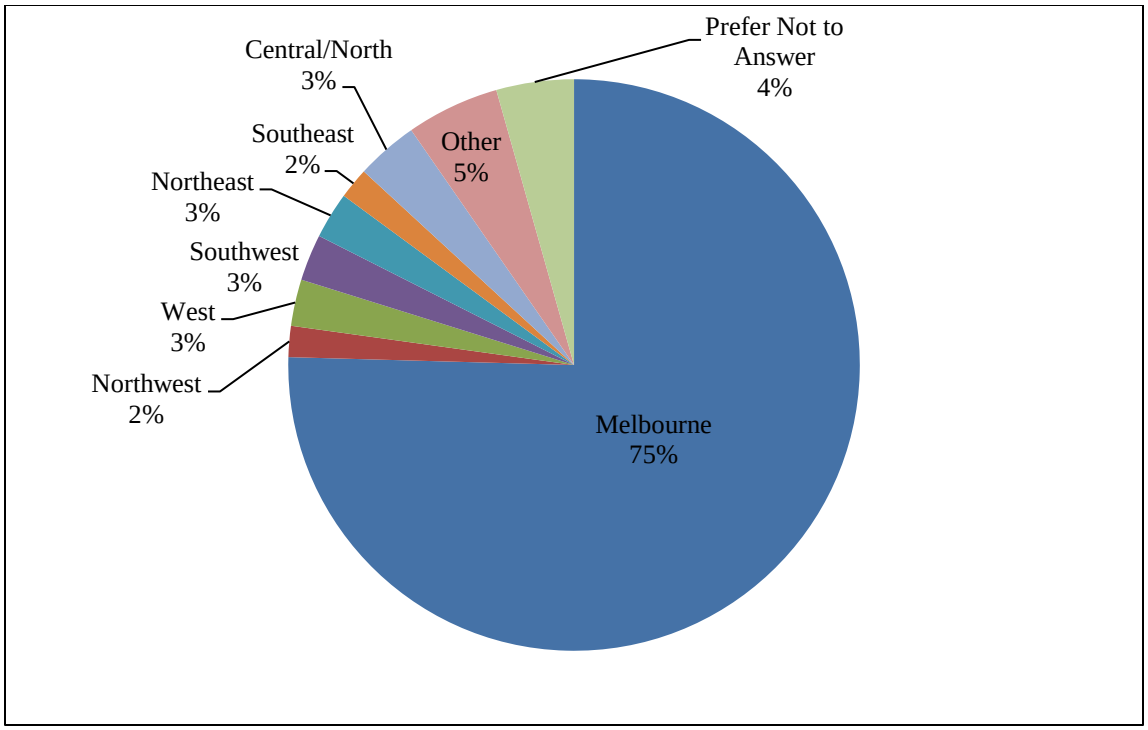

Figure 7 - Distribution of Regions

We asked the respondents the type of area they lived in and gave the choices city, country (in a town) or country (in a very small town or farm). Although the majority does live in a city area, there were some who live in town or very small town. Figure 8 displays the distribution of these results.

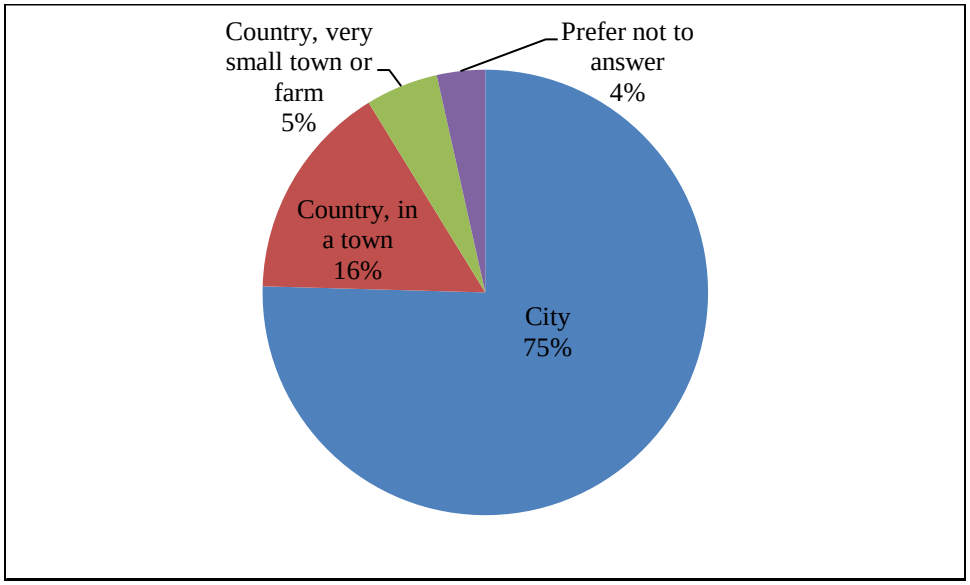

Figure 8 - City vs. Country Breakdown

4.1.6 Age of Hearing Loss

Another important piece of data we obtained through our survey was the age at which respondents became deaf. The majority were either born deaf or became deaf in childhood. However, there were some who lost their hearing at a later age. Figure 9 below shows the distribution between the different ages respondents lost their hearing.

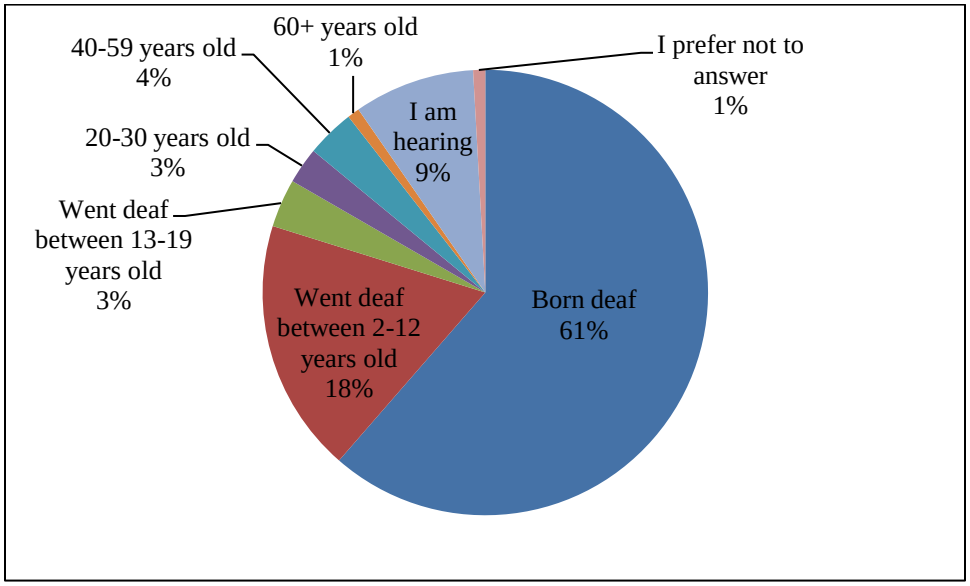

Figure 9 - Age of Hearing Loss

Communication technology used by a deaf person is affected by when he or she went deaf. Those who went deaf later on in life often do not know sign language and therefore are limited in the types of technology they can use. As we have discussed previously, many people who become deaf early on in life are not as fluent in the English language, possibly affecting the types of technology they prefer to use. The preferences among these different groups will be discussed later on in this chapter.

4.2 Available Technologies

As we discussed in our Methodology chapter, the first step to our analysis was to determine what types of communication technology the deaf have access to. This includes the physical technologies themselves as well as how much access the deaf have to the Internet. Although things like telephone systems are also important communication components, we chose to gather information about Internet access, because it has become a major component of communication technology in recent years, whereas telephone systems have been around for a

lot longer. We gathered data by conducting a focus group and a survey among the Victorian deaf population. The results of those methods are presented within the following subsections.

4.2.1 Internet Access

Having access to the Internet can greatly expand the communication options a person has. For the deaf, this access can be vital when communicating in a hearing world. Not only do many people have Internet access, but many have mobile Internet access. Since communication often takes place outside of the home or work, having mobile Internet access can make communicating much more convenient. The results of our survey indicated that everyone who was surveyed has access to the Internet either at home, at work or on a mobile device. In fact, 92% of people surveyed responded that they have Internet at home and more than half (57%) responded that they have access to the Internet on a mobile device.

Although respondents to the survey indicated they had access to the Internet, that access is not always the most reliable, especially when it comes to wireless Internet and Internet access through a mobile device. During our focus group we asked members of the Deaf community whether they had reliable access to the Internet. They all indicated that they could access the Internet at work, home and at a café or restaurant, but the majority of the responses had to do with how unreliable wireless and mobile Internet networks were. Video technology requires a strong Internet connection, if that connection drops out or is unable to support the proper bandwidth the Deaf cannot rely on it for sign language communication.

All of the respondents to our focus group indicated they had smartphone which allowed them to access the Internet using both wireless and 3G mobile Internet. However, they indicated wireless Internet was not always reliable and they were often forced to use 3G to access the Internet. However, not all video conferencing application support 3G and the ones that do support it use a large amount of data. Since the Deaf need this data to communicate they often use more data than their mobile plan allows, costing them more money. Even if they are willing to spend the extra money, they still do not have reliable 3G coverage throughout Australia. One respondent to the focus group indicated she had to switch her mobile phone carrier three times because she never had reliable coverage. She added that the one she currently has is the most reliable she has found, but it is also the most expensive. Many members of the Deaf community

use smartphones to communicate because of the technology's portability and its ability to connect to the Internet, but many people are faced with unreliable and expensive service.

4.2.2 Accessible Technologies

Although our ultimate goal was to determine what types of technologies would benefit deaf Victorians, we began by determining the technologies that the community initially had access to. The list of technologies we developed through our background research served as the main list we used for our survey. We asked respondents to select from the list, all of the technologies they had access to. Figure 10 below illustrates the most accessible technologies.

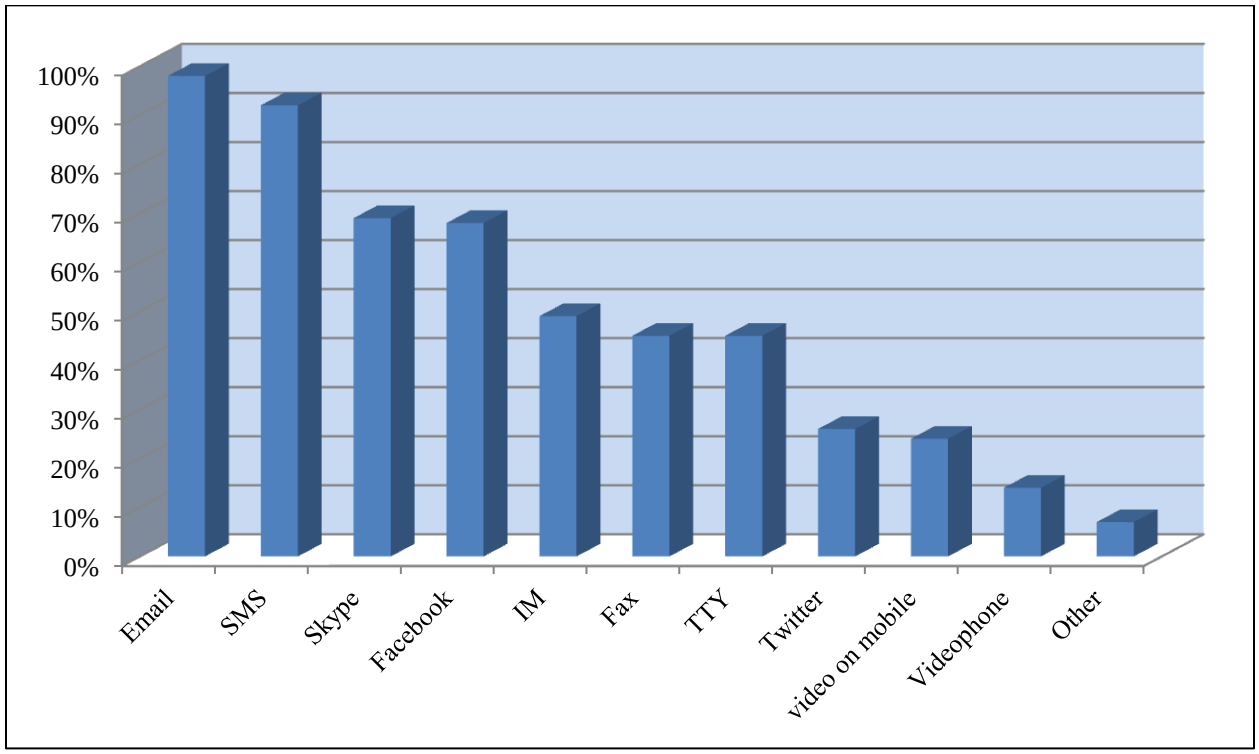

Figure 10 - Accessibility of Technologies

It was clear that the majority of those surveyed had access to technologies that we thought to be popular from the studies we looked at for our background research. Email and SMS were the most accessible technologies, with 98% and 92% of people selecting Email and SMS respectively. Although technologies like Skype, Facebook, and instant messaging were also rather accessible. Other technologies such as videophones and video chatting on a mobile device were not nearly as accessible among the group. Only 24% of people had access to video chatting on a mobile device and only 14% had access to a videophone. Since video-based technologies

allow Auslan signers to communicate using their preferred language, it may be beneficial if these types of technology were more accessible.

The choices listed on our survey also included an "other" option so that respondents could write in a technology that we may have forgotten or did not know about. Eight individuals selected this response, with four out of the eight indicating they had access to a captioned telephone or CapTel. This is a technology similar to TTY in that it uses text as part of a telephone call, but with a captioned telephone sound is still transmitted between both parties (CapTel, 2011). The machine is designed for a deaf person who is still able to speak and who may or may not have some residual hearing. The individual who has the CapTel machine receives captions of the conversation so that they can understand the conversation. The machine also works like a normal telephone so individuals can call someone who does not have a CapTel device (CapTel, 2011).

We cannot assume that only those people who wrote in this technology have access to it, because we may have received more responses if we had listed it as an option on our survey. While CapTel is similar to TTY, less than half of the respondents had access to TTY, which from our background research, seems to be a technology that is generally falling out of favor (Job Access, 2011). CapTel is more advanced and more convenient in that the user does not need a relay service to call a regular telephone. A technology such as CapTel could prove beneficial to some of the Deaf and hard of hearing, however, it does have some drawbacks as we learned from our focus group.

One member of the focus group indicated that he used a caption telephone, and although it was a relatively easy piece of equipment to use, the lag time between when a person speaks and when the captions appeared on the screen was frustrating. The respondent found that the delay that exists between a person speaking and the captions appearing on the screen was very frustrating and made it difficult to have a fluid conversation. Although this technology can certainly have its benefits and may be an improvement to TTY, it still may not be right for all people.

4.3 Most Commonly Used Technologies

To learn what technologies the deaf use to communicate we asked a series of questions on our survey as well as during our focus group. This information aided us in determining, of the available technologies, which were used most often and for what reasons.

4.3.1 Usage of Available Technologies

We determined that while a wide array of technologies are used by the deaf community there were a few technologies which were particularly popular for everyday use. Both Email and SMS were the most popular technologies with 92% and 91% showing daily use respectfully. Figure 11 shows the total number of respondents who used each technology as well as the breakdown of those who use it daily, weekly, monthly and every few months. Technologies that could be used for both the hearing and Deaf were the most popular overall. There was a focus on newer technologies, and those that did not use a lot of bandwidth.

Outside of daily use, the large disparities in technology usage disappear. As shown in Figure 11, a majority of technologies have a large number of users who use the technology daily, and then gain fewer users in each subsequent category. For example, both Email and SMS, have a large number of users on the daily level, but only show a minor gain when analyzed by weekly use. SMS shows no gains at all at the monthly level. This trend is followed by all of the technologies on our survey, except for Fax and Skype.

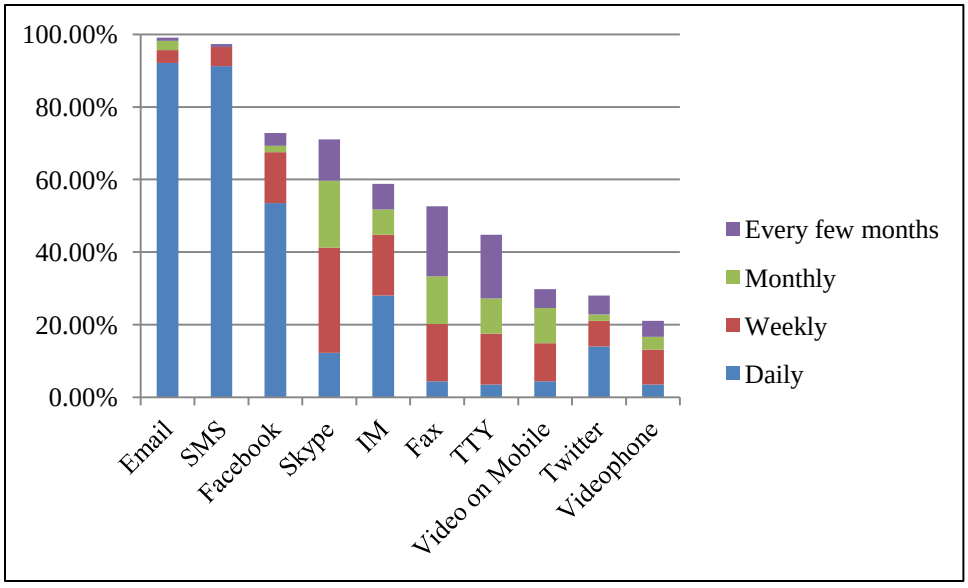

Figure 11 - Overall Usage of Technologies

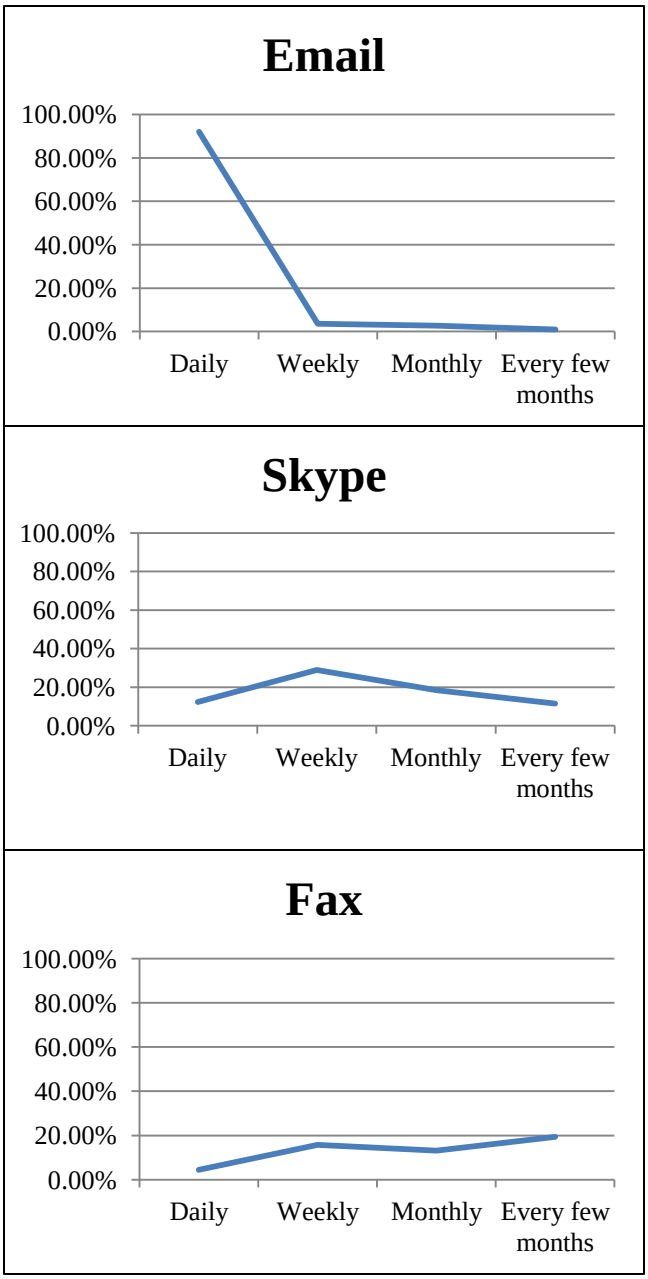

Figure 12 - Comparison of Usage for Email, Skype and Fax

Fax had very few daily users, but a majority of its usage occurs every few months. Skype's usage was unique among all of the responses because the usage of the technology was relatively consistent across each category, indicating that Skype, while popular with the respondents, is most commonly used when a situation needs it, and not out of ease of use or popularity.

Figure 12 shows a comparison between three technologies' usage. The top chart, Email displays the front loaded nature of the most popular technologies, where most respondents use the technology every day. The usage of Skype was more consistent across each timeframe and never had a steep drop. As noted above, many respondents did not use Fax on a regular basis, however as the timeframe increased so did the amount of users. Indicating the technology was still used, but not very frequently. Among the technologies that did not see much use were: TTY, Videophone, Video Chat (Mobile), and Twitter.

4.3.2 Usage of VRI

Vicdeaf and the Australian Government collaborated to create the Video Relay Interpreting (VRI) service for the Deaf population. When asked if they used VRI, a majority of respondents indicated they did not know about the technology. People who did use VRI, indicated they used it because of the clarity of the image, its usefulness for meetings and preventing long travel and costs for interpreters. People did not use VRI because a large amount

of the people indicated they did not know what VRI is or how to use it. In addition people indicated that they did not use the technology because they were not comfortable using Auslan, were unable to leave work to go to a VRI location, did not have a VRI room located close to them , or felt there is a lag in video interpreting.

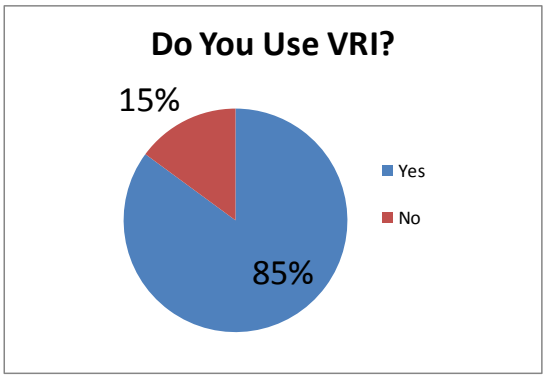

Figure 13 - Usage of VRI

4.4 Preferences and Constraints

In order to complete our objective of identifying which technologies the deaf prefer to use and what aspects of different technologies people like, we asked specific questions on our survey and in our focus group addressing these preferences. After collecting the data from the survey, we were able to analyze the data by different factors that allowed us to determine if any of those factors had an influence on preferences for certain technologies. The following sections present our findings of preferences for the overall population that was surveyed, as well as the preferences grouped by age, when in life the respondent became deaf, and whether or not the respondent lived in a rural or urban environment.

4.4.1 Overall Preferences

In our survey, we asked our respondents to select one technology that they preferred above the others. This gave us an indication of which technologies people liked the most, and which technologies worked the best for the greatest number of people. The top three favorite technologies for the overall population were SMS, Email and some form of video chatting.

These three technologies were overwhelmingly favored and represented 88% of the overall population, with 40% choosing SMS, 32% choosing Email and 16% choosing some form of video chatting. The remaining 12% of respondents favored instant messaging, captioned telephones or other forms of technology. No one selected either TTY or Fax as their favorite technology. The results of the survey are represented in Figure 14.

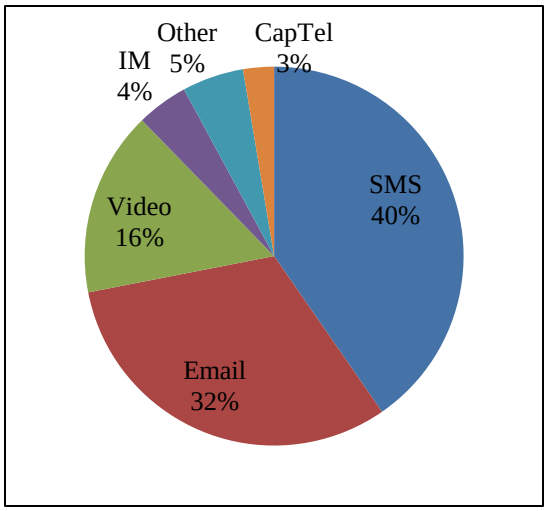

Figure 14 - Favorite Technology

We also asked respondents to explain why they chose their favorite technology. SMS was most commonly chosen because it was a quick, easy way to communicate that can be used whenever and wherever. Email was popular because it was also easy to use and it allowed people to send more information than SMS. In addition, Email allows people to share pictures and other types of documents or files. Many people also mentioned that, unlike video chatting, both Email and SMS allowed them to communicate with both deaf and hearing people, whereas with video they can only communicate with someone else who is Deaf or signs.

The 16% that chose video communication as their favorite technology was determined by combining the results from three different technologies that enable video chatting: Internet-based video chatting using Skype or a similar program, video chatting on a mobile phone, and video chatting using a stationary videophone. Of the 18 people who chose some form of video chatting, 11 chose Skype as their favorite form of technology.

Skype has many advantages over the other video chatting technologies that result in it being a more preferred form of technology. Primarily, Skype and the majority of Internet-based video chat programs are free programs that can be downloaded from the Internet. For the past few years, most laptops have been made with built-in video cameras, so there is no extra cost to chat via Skype. Even if a person has an older model laptop or a desktop computer without a camera, Skype is often the cheaper option because video cameras are much less expensive than purchasing a videophone or mobile phone. The screen on a laptop or computer is also much larger than that of a mobile phone or video phone, so it is typically easier to see and follow signed conversations. One major disadvantage of video communication on a computer is that it lacks portability, which people on our survey indicated is an important factor that they want in communication technologies.

Four people on the survey chose video chatting on a mobile phone as their favorite form of communication. In addition, all five of our survey participants owned a smartphone and said that they often used it to converse in Auslan. Video chatting on a mobile phone is a portable

technology that people can take with them and have access to wherever they are, provided they have service. Most mobile phones have the ability to record a video and then send it as a multimedia message (MMS). This is a simplified version of video chatting as it does not require a smartphone or use any Internet data, but it lacks the ability to seamlessly converse that other forms of video chatting have. There is a delay between recording a message, sending it, having the other person watch the video, record their response and send it back. Many smartphones have the ability to use applications such as Tango, Facetime, or Skype to facilitate instantaneous communication via video chatting. However, smartphones cost much more than other mobile phones and require a data plan. Even with this data plan most video chatting applications do not run on 3G and require a Wi-Fi connection that is not always available. Also, the display screen on mobile phones is quite small and the video quality is not always clear enough to easily see what is being signed.

Videophones were selected by 3 of the 18 respondents. Videophones have excellent picture quality because they are built into the phone line and designed for the purpose of video chatting. However, many people do not like to use them because the phone units can cost up to several hundred dollars and they lack the portability of a mobile phone. Also, unlike computers or mobile phones, videophones do not serve any other purpose.

TTY is a technology that is designed specifically for people who are deaf and hard of hearing to use a telephone system. However, our survey shows that TTY is falling out of favor and being replaced by newer technologies that serve multiple purposes. None of our respondents listed TTY as their favorite technology and 55% of respondents do not use TTY at all. Of the respondents who do use it, 48% use it solely for business purposes, 36% use it for both business and personal use, while only 19% use it solely for personal use.

In addition to asking about specific technologies, we asked respondents to select which aspects of technologies are most important to them. We gave them the choices of: low cost, having the technology on a computer or laptop, having the technology on a mobile phone or tablet, easy to use, video capabilities and other. For the overall population, 69% chose easy to use, 59% chose low cost, and 56% chose having the technology on a mobile phone or tablet. Only 24% of the overall population chose video as one of their most important aspects. These data shows that people want something simple, that they do not have to go through too much effort to use, they want technologies that are not going to cost them too much, and they like to be

able to have the on mobile devices so that they have access to them wherever they go. These data also show that video is less important to the overall population, possibly because it can only be with those who can sign, whereas other forms of communication are more versatile.

4.4.2 Age Groups

Technology is a constantly evolving medium and often times different age ranges use and embrace different technologies at different speeds. In order to effectively look at what technologies would best serve the deaf, we broke our samples down into three age ranges and determined what technologies each preferred and used. The first group was the younger age ranges of respondents, 15-29, the second was ages 30-49, and finally the third was ages 50 and older.

Younger generations are known to be more invested in newer technologies and big users of social media and networking. As can be seen in Figure 15, out of all the available technologies, Facebook was the only technology used every day by 100% of the younger respondents, followed closely by Email and SMS with a 91% usage rate. TTY, one of the oldest technologies on our survey, was used by very few people in the younger age group and those that did use the technology did not use it on a regular basis. Although TTYs were developed for the deaf, they are quickly falling out of favor and being replaced by newer technologies. The most popular technology for the younger generation was split between Email and SMS, indicating that while Facebook was most commonly used among that age group, it was not the most popular for communication.

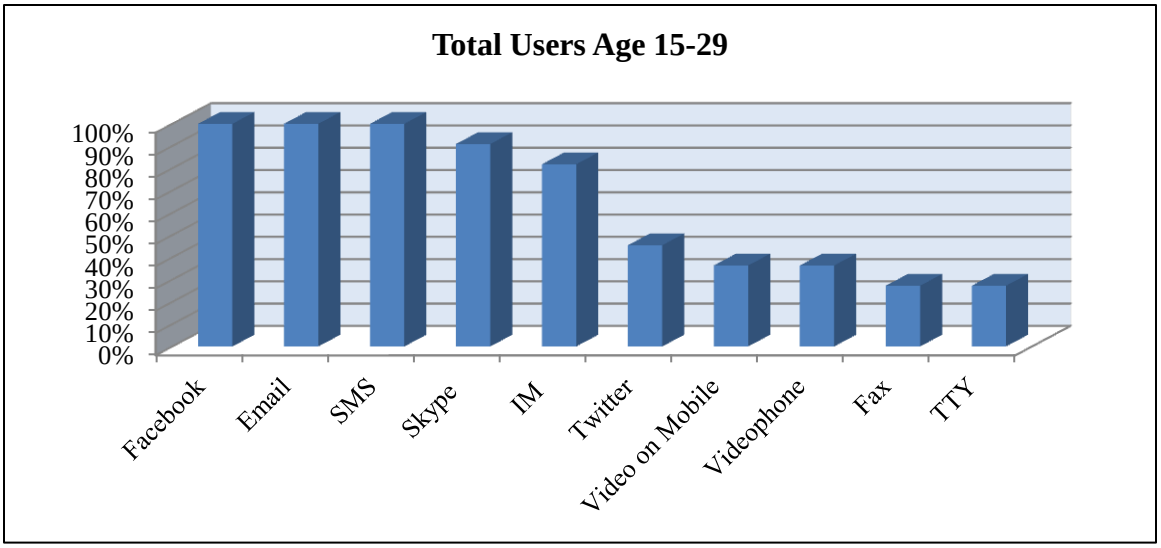

Figure 15 - Technology Usage for the 15-29 Age Group

For the middle age range the technology choices were similar but had fewer users constantly communicating through social media. The most frequently used technologies were once again Email and SMS, but both Facebook and Twitter showed declines in use compared to the younger respondents. The favorite technology of the 30-49 year-olds was SMS, because of its versatility in who can be contacted, ease of use, and availability. Email was a close second because of the ability to respond when you have the time and ability to be used more professionally. The total usage of this age range can be seen in Figure 16.

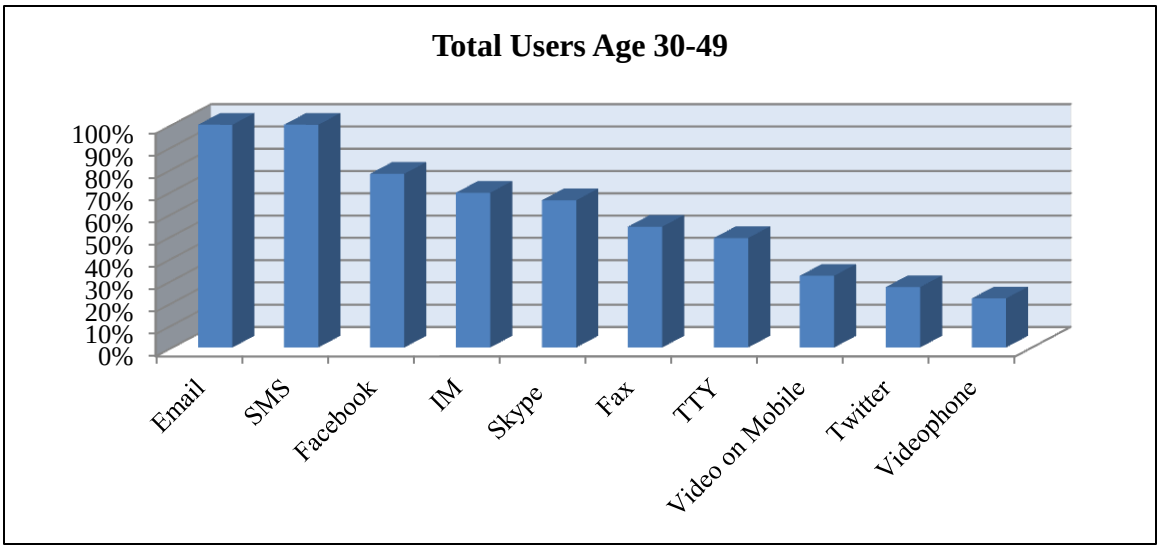

Figure 16 - Technology Usage for the 30-49 Age Group

The oldest age group was also very involved with many technologies and used a lot of the options that were popular with the younger generations. Again, as can be seen in Figure 17, Email and SMS were the most popular technologies to use for communication. Skype and other video chat programs were also more popular among the older age group than they were with the middle and younger ages. However, older technologies like TTY and Fax were still not very popular for common usage. The most preferred technology of the oldest population was Email because all of the respondents had the technology, could respond on their own terms, had an easier time typing on a computer keyboard and were able to use it for communicating with both the hearing and the deaf.

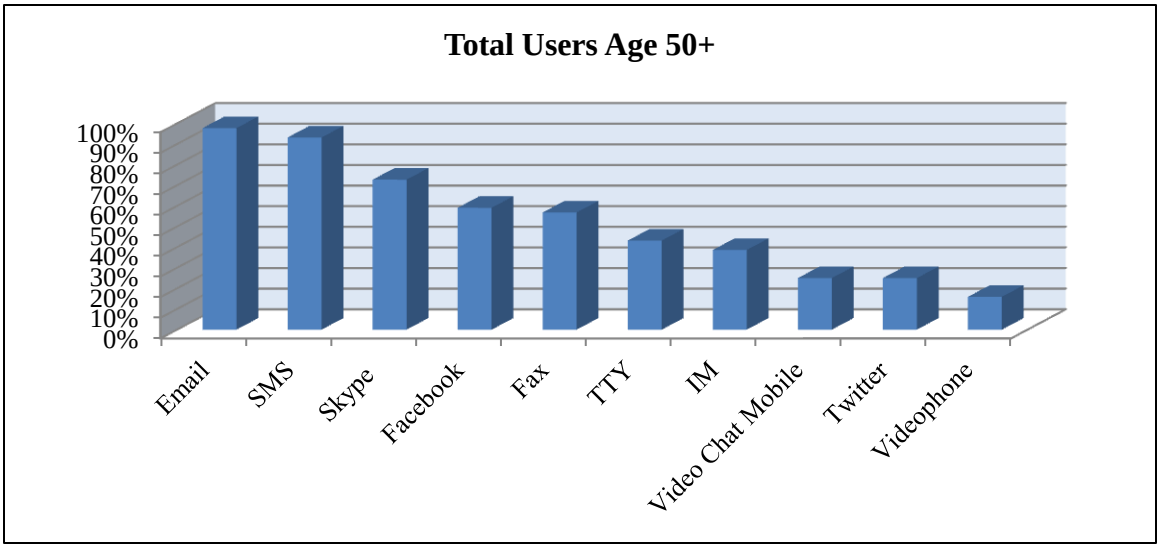

Figure 17 - Technology Usage for the 50+ Age Group

From analyzing the different age groups our team obtained a lot of data. The older technologies, TTY and Fax, were not common technologies for any age range to use. This could mean that the technology has run its course and the users have moved on and only use it when they are required to do so. Social media is a growing form of communication and naturally the youngest generation is more inclined to use the technology, but it is also gaining popularity with the older deaf population. As a result of its growing popularity, social networking could be a viable channel to distribute information to the deaf population as a whole. Across all ages, the technologies that were preferred could work with both the hearing and the deaf. This was seen as a major benefit of using a particular technology.

4.4.3 Age of Hearing Loss and First Language

The age at which a person lost their hearing can strongly impact the technologies that they prefer to use to communicate. People who are born deaf or who lose their hearing early in life are more likely to rely on sign language than oral or written language. 83% of the people who chose some form of video chatting as their favorite technology were born deaf. Only one person who chose a form of video chatting went deaf over the age of twelve. In addition, 61% of people who use video chat listed Auslan as their first language.

As we have mentioned in our background, if a person is born deaf, he or she often has difficulty with written and oral language. It is more likely that someone who is born deaf or who goes deaf as a child will learn Auslan and use that as a primary means of communication. People who use Auslan prefer to use video-based communication because Auslan is a visual language.

Also, people who use Auslan regularly and those who have poor written language skill tend to prefer video communication methods over text based forms of communications because of the difficulty understanding and being understood when using written language.

On the question regarding the most important aspects of technology, 35% of people who listed Auslan as their first language selected video as one of their most important aspects for a technology, as opposed to the 24% of the overall population. This makes sense because people who rely on Auslan to communicate need visual technologies in order to see and communicate.

In addition, all of our focus group respondents used Auslan to communicate. One participant was able to hear and speak on a one-on-one basis by using hearing aids, but still used Auslan on a regular basis and in a group setting. Four of the five respondents said that they would prefer to use video chatting to communicate with someone because it allows them to convey emotion and it is easier to have longer, more in-depth conversations.

4.4.4 Regional vs. Metropolitan

We were also able to reach some of the regional areas of Victoria. As we discussed previously in the section, we asked respondents whether they lived in the city or the country. In order to analyze data specifically for the regional deaf in Victoria, we filtered our results so that we could see only the responses from people who indicated they lived within the country, either in a town or a small town/farm.

Out of the 114 responses we received on our survey 21% indicated they lived the in country areas of Victoria. This is consistent with the population of Victoria as a whole, because according to the 2006 census, 27% of the Victorians do not live in Melbourne. Although we did receive valuable information from our focus group, all of the participants of that group were local to the Melbourne area, so they could not provide us with much insight into the preferences of the regional deaf community.

Overall on our survey, the distribution of respondents' first languages was relatively even. However, for the regional deaf, the majority of respondents (83%) chose English as their first language. This is significant because if a deaf person is well versed in English, he or she may have an easier time understanding written English and may have a harder time using Auslan. Since there are fewer deaf people who live in the regional areas of Victoria, it may make

sense for the people who do live in those areas to find ways to communicate using English instead of Auslan, since there are fewer people who would know Auslan.

Even though Auslan can often be the first language of people who are born deaf, this is not as true for the regional areas of Victoria. Out of the 24 regional deaf respondents, 67% were either born deaf or went deaf early on in their life. In fact only 5 people went deaf when they were over the age of 13. Even with the majority of these respondents being born deaf or going deaf early in life, most of them still consider English their first language, meaning they were most likely exposed to English more than they were to Auslan.

As with the overall results, the regional deaf favor both Email and SMS for communication. Almost all of the 24 respondents indicated they use those technologies, with 96% using Email daily and 83% using SMS daily. The remaining respondents use the technologies either weekly or monthly, with one respondent indicating they do not use SMS. Email and SMS were also the most popular technologies when respondents were asked to indicate their favorite technologies. Out of all the technologies listed, 42% of regional deaf respondents chose SMS and 29% chose Email. These results are similar to the overall results we received and regional deaf individuals provided similar reasons as to why these technologies were their favorite.

Our team also looked at the types of technology the regional deaf do not use. Of the 24 respondents, 79% of them do not use either videophones or video chatting on a mobile phone. In addition, 46% do not use Skype. One reason for this could be that since the majority of respondents learned English first, they may not be as comfortable with signing and therefore video-based technology is not as widely used. There are fewer people to sign with in regional areas, so even though video technology allows Deaf people to communicate using sign language, it may not be beneficial for someone who does not use sign language as much.

In fact, the regional deaf often do not look for video capabilities when deciding what technology they want to use. Out of the 24 total regional respondents, only one indicated a preference for technologies with video capabilities. Regional deaf respondents most often chose low cost, ease of use and mobility as the things they look for most in communication technologies. Low cost was particularly important to people in the regional areas, as shown by the 79% of respondents who listed low cost as a preference when comparatively, only 49% of people who live in the city chose this as an important aspect of technology. People who live in

the regional areas of Victoria tend to make less money than people in the city, so it makes sense that cost is more of a concern. In regional areas, 54% of the respondents make less than $37,000 per year, while in the city only 29% earn less than $37,000.

Similar to the overall results, 83% of regional respondents did not use VRI. When asked why they did not use the technology, some responded with similar reasoning in that they did not know what VRI was. However, multiple responses indicated that some members of the regional deaf population have no use for VRI because they either have hearing aids or cochlear implants. Many also indicated that they were not comfortable using Auslan and therefore preferred other technologies, such as captioning services.

4.5 Upcoming Technology

In order to determine what the deaf community knows about upcoming technologies, our survey and focus group included questions asking respondents whether or not they were familiar with some new and upcoming technologies. We also conducted an interview with an employee of a technology company in order to gain a better understanding of what certain technologies were used for.

4.5.1 Microsoft Lync

The first technology we inquired about was Microsoft Lync. Vicdeaf had recently updated their interoffice communication systems to use Microsoft Lync so it was a well known technology within the company. However, when questioned about whether or not the respondents knew what Microsoft Lync was, 81% did not know about the technology. This corresponds with what we learned from an employee at Generation E, the company that installed Microsoft Lync at Vicdeaf. He indicated that Microsoft Lync is not designed or really available for noncommercial use and is more tailored for the corporate markets, like Vicdeaf (Bogensberger, 2012). He also informed us that while Microsoft Lync does have the ability to communicate with free services, like MSN messenger, but the Microsoft Lync user must initiate the conversation which makes it impractical for deaf services, since the deaf client would most likely be initiating the conversation.

4.5.2 Signing Avatars

Another upcoming technology that was of interest to our team was signing avatars. Signing avatars were clearly unknown to many, with 86% of the respondents indicating they do not know what the technology is. However, there were still 14% of respondents who did know what the avatars were, possibly indicating that the technology is becoming more widely known, especially with portable computer technologies.

Although our focus group participants did not know about signing avatars either, we did describe the technology to them and asked if they would use it. All of the participants indicated that if a technology like a signing avatar were available, they would use it, explaining that it would be convenient for times when an interpreter is not available.

4.6 Additional Comments

In this section we discuss some additional information we received from our survey and focus group. Although this information is not directly related to the scope of our project, the information is still important when it comes to improving services for the Deaf and hard of hearing.

4.6.1 National Relay Service

We received comments both on our survey and during our focus group that the National Relay Service (NRS) was not meeting the standards of some of the deaf population. One respondent to our survey commented that the he or she could not get access to the Internet components of the NRS because it was not compatible with Apple products. Members of our focus group also noted that NRS Internet services could only be accessed by using a certain browser. One participant of the focus group suggested that the NRS develop a smartphone application to make the services more accessible. Although the NRS was originally designed to be used with TTY, our results indicate that the technology is generally falling out of favor with members of the deaf community. However, Internet NRS services could be very beneficial to the deaf population if it is developed and run efficiently.

4.6.2 Emergency SMS System

During our focus group and on our survey there was also discussion of an emergency SMS system. Although there is a system currently in Australia that will send warning SMS

messages to people, there is no system where someone can message emergency services if he or she is in a dangerous situation. A participant of our focus group discussed how in New Zealand there is a system in place where someone can message “111” in an emergency situation. Although the system Australia currently has in place is beneficial in spreading information about natural disasters and other major emergency situations, it is not a two-way system. If a deaf person is in an emergency situation, it would be much easier to SMS emergency services rather than try to call or find someone to call for them.

4.6.3 Captioning for Movies

Something that came as a surprise to our group was that some movie DVDs sold in Australia do not come with captions. One participant of our focus group expressed her frustration at purchasing a movie and then having to return it because it did not come with captions. The same participant also explained that there are almost no movie theaters that have open captioning. In order to watch a movie in theaters a deaf person must use personal captioning equipment that is bulky, awkward and complicated to operate. If theaters showed movies with open captioning, where captions are provided on the screen, deaf people would not have to use troublesome equipment. Members of our focus group explained that when they use the personal captioning equipment, other people stare at them because the equipment is so distracting. Captions on a movie screen would be much less distracting than someone trying to operate a large, bulky piece of equipment.

5 CONCLUSIONS & RECOMMENDATIONS

After gathering all of our data, we then began to draw conclusions based on the information we found. In this chapter we discuss the final conclusions our team developed using that information. These conclusions aided us in developing recommendations that may be used by both Vicdeaf and other similar organizations to provide effective means of communication to the Deaf and hard of hearing.

5.1 Conclusions

The results from our survey showed that Email and SMS were the most popular form of communication, and these results were reiterated by our focus group. As with the studies we discussed in our background chapter, these two technologies were chosen because of their ease of use and their lower cost. However, on our survey many respondents indicated that these technologies were their favorite because they could be used to communicate with both hearing and deaf individuals.

Although Email and SMS are convenient ways to communicate, they are not ideal for all situations. The introduction of VRI was an attempt to provide the Deaf with a solution to these situations; however, our results showed that many Deaf and hard of hearing individuals did not know what VRI was. Therefore it is our recommendation that Vicdeaf revisit education methods and develop new ways of sharing information with the deaf community.

One of the major problems deaf people in Victoria have found with using technology is that phone and Internet service are not reliable and are often very costly. There are many dead zones where there is no phone or wireless coverage. Our team recommends that Vicdeaf work with other deaf organizations to lobby for change with service providers and local government. Although updating this system will not be an immediate solution, limited improvements can be made until the infrastructure is created to support heavy phone and Internet activity, and improving the current situation will not only help the deaf, but the population as a whole.

The results of our survey show that the deaf population in regional Victoria prefers to use communication technologies that do not rely on sign language. Therefore, our team recommends that captioning technologies be expanded and provided for the deaf people living outside the Melbourne area.

There are also relatively new technologies that would help improve communication for the Deaf in Victoria. MobileASL and signing avatars are only beginning to be introduced in the US and the UK, and are not available anywhere in Australia. Although MobileASL is still in the beginning stages of development, we recommend that Vicdeaf follow the production of this technology and look into developing signing avatars in Auslan because the technology is available; it just needs to be developed in the local language.

Our team was able to identify valuable information concerning the types of technology used by the Victorian deaf community as well as what the members of this community would like to see in their technology. With this information, we have developed recommendations in regards to education, phone and Internet service, the regional deaf population's need, and future technology. We believe that improvement in these areas will benefit the deaf community most and will result in more effective means of communication. The next section provides more detail on each of these recommendations.

5.2 Recommendations for Communication Technologies

In this section our team discusses the recommendations we have developed to help improve the communication technologies used by the Deaf and hard of hearing in Victoria, Australia. Although these recommendations are intended for Vicdeaf, they may prove useful to similar organizations in Australia and around the world.

5.2.1 Education

We found that many people in the deaf community are not receiving the information that Vicdeaf is distributing. When VRI was first introduced, Vicdeaf conducted training and information programs about the technology. Although Vicdeaf has attempted to educate people about VRI, the results of our survey and focus group show that many people still lack knowledge about the technology. Our team recommends that Vicdeaf revisit community education programs that teach people about VRI. The first goal should be raising awareness of what VRI is and educating people on how the technology can be useful in their lives. Then the focus should be shifted to training people how to use the service. Revisiting the VRI education program and finding new ways of getting information to people will also help Vicdeaf figure out the best ways of keeping people informed about other events and services the organization sponsors.

In order to provide better, more immediate access to people, we advise that Vicdeaf create a smartphone application. This app should allow people to get news updates about Vicdeaf services and events in their area. In addition, it should allow people to easily book interpreters, VRI rooms or use other Vicdeaf services. Although there is a way to save the Vicdeaf website as an icon on a smartphone, it would be more beneficial to create an app because some people may not know how to save a website to the home screen of their phones. Also, the formatting of an app would be much more user-friendly than simply saving the Vicdeaf website to the smartphone. If a Vicdeaf created an application they could send news updates and alerts straight to a person's mobile device. As more people invest in smartphones, having an application would allow Vicdeaf to share information with their clients much more easily.

5.2.2 Phone and Internet Service

The results of our survey and focus group indicated that deaf people like the technologies that they are currently using, but certain problems they encounter cause frustrations and sometimes keep them from being able to communicate well with others. One participant of our focus group indicated that he would prefer to focus on improving the technologies that already exist, instead of introducing new technology. The participant added that new technologies generally have problems of their own. The most popular form of communication from our survey was SMS; however, there are many limitations associated with SMS. The primary concerns are plan coverage and cost of plans. Phone coverage across Victoria, even in cities such as Melbourne, is not adequate. There are many areas where service is not available at all, as indicated by the participants of our focus group. One of the main topics of discussion during our focus group was the phone coverage and because deaf people use SMS so frequently, if a deaf individual is in an area with no phone coverage, they have a much more difficult time communicating with others.

Many participants of our focus group also indicated that they go over the limit of their data plans very quickly. Since deaf people do not use the voice capabilities of their phone, they must use features of the phone that often require access to the Internet. Although SMS does not require Internet data, things like Email, Facebook, Twitter and many other applications use up a person's data plan. Participants of our focus group indicated that since their communication often

requires the use of data they go through their plans' allowance much faster than most other users and must pay extra for the additional data usage.

In the United States and other countries, most of the major service providers offer a text or data only plan for people who are Deaf or hard of hearing. Some of these plans are available to anyone, while for others you must prove that you are deaf in order to purchase the plan. These plans allow people to be more flexible with what services they use. For instance, these types of plans do not charge people for the calls or voice messages they are unable to use. In Australia none of the major service providers offer such a plan. If deaf people in Australia, and more specifically Victoria, had access to data only plans, they would be able to either use the same amount of data for less money or they would be able to spend the same amount of money and have access to more data.

Many deaf people have turned to smartphones, which allow them to combine SMS, Email, Skype and web-browsing in one small, mobile device. However, smartphone data plans can be costly for a small amount of data. If a deaf person wants to use his or her phone to converse with someone using sign language, using video requires a lot of Internet data. Most phone plans not only require deaf people to pay for voice minutes they never use, but these plans also limit the amount of data a person can use. This greatly restricts a deaf person's ability to communicate using sign language.

In order to help remedy the current phone situation, our team's recommendations to Vicdeaf are to work with other deaf organizations and advocacy groups to lobby telecommunication service providers as well as the local and federal government to provide the deaf with service plans that suit their needs. Although this may take time, in the end better phone coverage and data plans would not only help the deaf community, but it would help the whole of Victoria as well.

Access to Internet also affects how the deaf use technology to communicate. The NBN aims to provide access to high-speed Internet for all Australians, but for the deaf, Internet is a main component for a majority of their communication. The NBN will improve video conferencing via Skype and other web-based video conferencing programs by improving the picture quality and preventing stream lag problems that occur with lower speed Internet. With better picture quality it will become much easier for deaf people to use sign language for

communication purposes. Having better access to Internet will also increase access to and use of Email.

A government initiative is already in place that provides free high-speed internet access to seniors. While this program is mainly educational to teach and encourage seniors to participate in the digital world, we feel that this program can provide a basis for a program for the deaf. While the NBN is only in the beginning stages of its implementation, Vicdeaf and other deaf groups can begin working with the government and NBN service providers now to negotiate subsidies or other service arrangements so that the cost of Internet could be reduced for the deaf.

5.2.3 Regional Deaf

The regional deaf population is much smaller the deaf population in Melbourne. Those individuals who do not live close to the city do not have as much access to resources and therefore must find different ways to communicate. Since there are fewer deaf in regional areas, often there are not enough deaf people within a community for sign language to be a useful form of communication. Therefore it may be more convenient for members of the deaf community who live farther away from Melbourne to use English more often than Auslan and to find ways to communicate that do not involve signing.

In order to provide regional deaf individuals with effective means of communication, our teams' first recommendation is to invest in and advocate for captioned telephones, like CapTel. Since many regional deaf consider English to be their first language, these individuals generally have an easier time reading captions.

The Australian Communication Exchange (ACE) has been testing captioned telephone service for about a year (Bennetts, 2012). They have provided handset telephones to 500 people throughout Australia. At the moment, ACE has no government funding for the trial, so they cannot extend the trial to anymore people. If a deaf person wishes to participate in the trial, he or she must register on a waiting list and if a handset gets returned, it will be distributed to the next person on the waiting list (Australian Communication Exchange, 2011). The infrastructure to support captioned telephone service has been built, but there are many more than just 500 people who can benefit from the service.

Only two regional deaf people indicated on our survey that they had access to and used a caption telephone. It was chosen as the favorite technology for one of these individuals. If more

of the regional deaf population of Victoria were given access to captioned telephones, they would be able to use a real time service that allows for longer and more in depth communication. There are also web-based captioned telephone services that are available within the United States. These services allow a Deaf or hard of hearing individual to use any type of telephone to make a call and provides them with captions of the conversation on an Internet browser. There is also a smartphone application that allows a person to do the same thing, but on their mobile phone. If these types of services were widely implemented within Victoria, or even Australia as a whole, many deaf individuals would have the ability to communicate more easily. However, funding is required for such services to be implemented effectively.

Similar to captioned telephones, our team also recommends developing a method to provide captions with Skype or another type of video conferencing program. Currently there is no way to access captioning through the Skype program, but if current voice-to-text software were either advertised or provided, some Deaf and hard of hearing individuals would be able to use video communication more easily. Currently deaf individuals can only use video communication with someone who signs or with the help of an interpreter. If video conferencing software were provided with captions, a hearing person and a deaf person would be able to communicate with each other face to face and would not necessarily need to go through an interpreter. Unless some sort of relay service was developed, the deaf person would need to be able to speak so that they could respond to the hearing person.

Captions on Skype would be a good technology to provide to regional deaf individuals because if they have stronger speech ability and are not as strong in signing, it would allow them to use video communication much more easily. In order to provide captions with Skype, a separate program would need to be used to capture the audio of the conversation and convert that audio to text. There are currently some voice-to-text programs available, like Dragon Naturally Speaking software that would be able to do this (Nuance, 2012). However, because this software is relatively expensive, it may not be feasible for an individual deaf person to purchase. If Vicdeaf could somehow provide this software or find a way to subsidize the cost of the software, it would give some deaf individuals better access to video technologies.

5.2.4 Future Technology

Technology is a constantly changing entity and as time goes on new and improved technologies will become available. Two technologies that are being developed currently in the United States could be of great use to the Deaf population in Victoria. One is MobileASL, which allows video chat over 3G with limited data usage and the other is computer generated interpreting from signing avatars.

MobileASL is a technology under development at the University of Washington to enable video chat for the Deaf on their mobile phones. MobileASL differs from Facetime and other apps because it is designed specifically for sign language. MobileASL's main goal is to reduce the amount of data used when sending the video, which can be accomplished by focusing the video on a person's hands and face. Our recommendation is for Vicdeaf to follow the development and release of the product and see how it fairs in America. MobileASL will be able to help the Deaf population of Australia better manage their data and get more usage out of the limited amount they receive each month, while still having all of the advantages of video communication. MobileASL can also be viewed as an improvement on existing video technologies which is what participants of our focus group indicated they wanted, and would be easy to use considering that video communication is widely used amongst the Deaf.

The other technology which is becoming more readily available is signing avatars. The avatars will allow for sign language interpretation without the need of an interpreter in person, and could be used by the population when Internet is not available or is unreliable and an interpreter cannot be there on site. Currently no Auslan avatars exist, so any existing program will need to be adapted to be used with Auslan before they could be used in Australia. In addition, automatic interpretation from English to sign language is still being developed. There has been some success in automated interpretation with SiSi a program developed by IBM, and TESSA which has been developed for British Post Offices as a part of Visicast (IBM, 2007; VisiCAST, 2012). With funding these programs could be developed for Auslan and utilized by the Deaf and hard of hearing in Australia, especially if they include the English text of what has been spoken.

Both MobileASL and signing avatars will help the Deaf populations communicate once publically available. MobileASL will help limit data usage while still enabling mobile sign language. Signing Avatars will enable interpretation when Internet and interpreters are not

available but will still allow the deaf to get information that they need. By better educating the deaf community, increasing access to information, advocating for better phone service and fair rates, and following the development of new technologies, Vicdeaf will be able to improve and diversify the communication options for the Deaf and hard of hearing in Victoria.

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APPENDIX A – Survey Questions

1. Are you:
    - Male
    - Female
    - I prefer not to answer

2. What is your first language:
    - Auslan
    - English
    - Other:

3. How old are you:
    - 15-19
    - 20-29
    - 30-39
    - 40-49
    - 50-69
    - 70+
    - I prefer not to answer

4. What is your income:
    - Less than $37,000
    - Between $37,001 and $80,000
    - Between $80,001 and $180,000
    - Above $180,001
    - I prefer not to answer

5. Which area of Victoria do you live in:
    - Melbourne
    - Northwest (e.g. Mildura)
    - West (e.g. Horsham)
    - Southwest (e.g. Warrmabool)

- Northeast (e.g. Albury/Wodonga)
- Southeast (e.g. Sale)
- I prefer not to answer
- I wrote my postal code below:

6. Where do you live:
    - City
    - Country, in a town (e.g. Ballarat, Bendigo)
    - Country, very small town or a farm
    - I prefer not to answer

7. Were you:
    - Born deaf
    - Went deaf between 2-12 years old
    - Went deaf between 13-19 years old
    - 20-30 years old
    - 40-59 years old
    - 60+ years old
    - I am hearing
    - I prefer not to answer

8. Do you have access to the Internet: (please select all that apply)
    - At home
    - At work
    - On a mobile phone
    - I do not have access to the Internet
    - Other:

9. I have access to: (please select all that apply)
    - TTY
    - Email
    - Fax
    - SMS

- IM (Instant Messaging/MSN)
- Videophone
- Video Chatting on mobile phone
- Skype (or other type of Skype like ooVoo)
- Facebook
- Twitter
- Other:

10. How often do you use the following:

	I do not use this	Daily	Weekly	Monthly	Every few Months
TTY					
Email					
Fax					
SMS					
IM					
Videophone					
Video Chatting on mobile phone					
Skype					
Facebook					
Twitter					

11. Do you use VRI (video relay interpreting):
    - Yes
    - No

12. Please explain why you do or do not use VRI:

13. Do you know about Microsoft Lync:
    - Yes
    - No

14. Do you know about signing avatars:

- Yes
- No

15. Which is your favorite technology: (Only pick one)
    - TTY
    - Email
    - Fax
    - SMS
    - IM (Instant Messaging/MSN)
    - Videophone
    - Video Chatting on a mobile phone
    - Skype (or other type of Skype like ooVoo)
    - Other:

16. Please explain why this is your favorite technology:

17. What do you use each technology for:

	I do not use this	Business	Personal	Both Business and Personal
TTY				
Email				
Fax				
SMS				
IM				
Videophone				
Video Chatting on mobile phone				
Skype				
Facebook				
Twitter				

18. Why do you use each technology: (please select all that apply)

	I do not use this	I have it	It is cheap	Every few Months
TTY				
Email				

Fax				
SMS				
IM				
Videophone				
Video Chatting on mobile phone				
Skype				
Facebook				
Twitter				

19. Why do you NOT use each technology:

	I do use this	I do not have it	Too expensive	Not easy to use	I do not know what it is
TTY					
Email					
Fax					
SMS					
IM					
Videophone					
Video Chatting on mobile phone					
Skype					
Facebook					
Twitter					

20. Which of the following are most important for you to have in a technology: (Choose only 3)
    - Low cost
    - Having the technology on a computer or laptop
    - Having the technology on a phone or mobile device (iPad, tablet, etc.)
    - Easy to use
    - Video so I can see the other person
    - Other:

21. Which services do you use from Vicdeaf the most: (please select all that apply)
    - Interpreting

- Notetaking
- Relay interpreter
- Auslan courses
- Duty worker
- Case manager
- Counseling services
- I do not use Vicdeaf's services
- Other:

22. Where do you go to get information: (please select all that apply)
    - Vicdeaf's website
    - Family members
    - Friends
    - Internet (Google)
    - None
    - Other:

23. Please provide any additional comments:

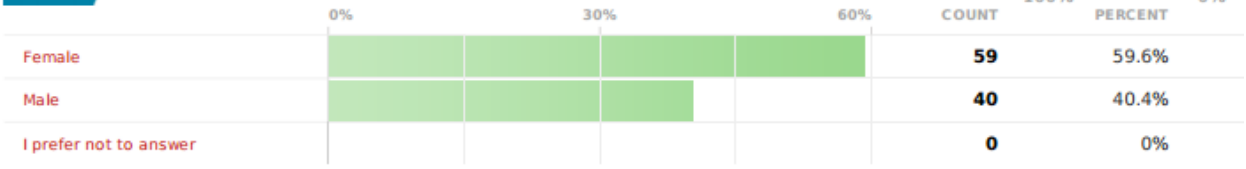
APPENDIX B – Interview & Focus Group Questions

- What Communication Technologies do you use on a regular basis? Why?
- How easily can you access the Internet?
- Which technologies are the easiest to use? Why?
- What communication technology do you use the most? The least?
- Why do you use that technology the most/least?
- What is the most frustrating aspect of the communication technology you use the most?
- How do you learn about communication technology?
- Do you use text or video communication more?
- How do you decide what communication technology to use in a given situation?
- Do you use/know about VRI?
- Would you be interested in being able to video chat on your mobile phones more easily?
- Would you use a program that would allow you to record sign language and send it as a text message?
- What do you look for in a technology?
- Is there anything you would want to see in upcoming technologies?

APPENDIX C – Survey Results

Question 01 **Are you: (*Mandatory*)**

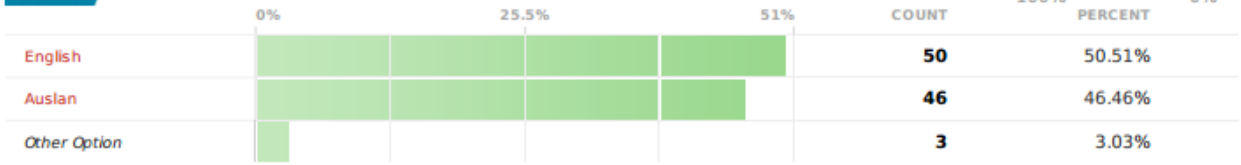
Answers 99 (100%) Skips 0 (0%)



	COUNT	PERCENT
Female	59	59.6%
Male	40	40.4%
I prefer not to answer	0	0%

Question 02 **What is your first language: (*Mandatory*)**

Answers 99 (100%) Skips 0 (0%)



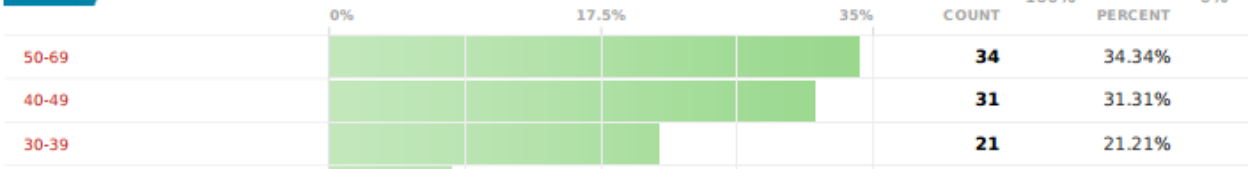
	COUNT	PERCENT
English	50	50.51%
Auslan	46	46.46%
Other Option	3	3.03%

Other Responses Answers 3

20,082,831	Cantonese	Today, 10:18AM
19,976,909	Total Communication	Friday, Feb 10th 3:17PM
19,392,355	New Zealand Sign Language and English (Bilingual)	Friday, Jan 27th 9:06AM

Question 03 **How old are you: (*Mandatory*)**

Answers 99 (100%) Skips 0 (0%)

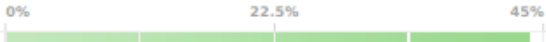


	COUNT	PERCENT
50-69	34	34.34%
40-49	31	31.31%
30-39	21	21.21%
20-29	8	8.08%
70+	3	3.03%
15-19	2	2.02%
I prefer not to answer	0	0%

Question 04

What is your income: (*Mandatory*)

Answers 100 (100%) | Skips 0 (0%)

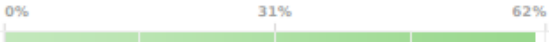


	COUNT	PERCENT
Between $37,001 and $80,000	44	44%
Less than $37,000	37	37%
I prefer not to answer	14	14%
Between $80,000 and $180,000	4	4%
Above $180,001	1	1%

Question 05

Which area of Victoria do you live in: (*Mandatory*)

Answers 100 (100%) | Skips 0 (0%)



	COUNT	PERCENT
Melbourne	61	61%
I wrote my postal code below	25	25%
I prefer not to answer	4	4%
Southwest (e.g. Warrambool)	3	3%
West (e.g. Horsham)	3	3%
Northeast (e.g. Albury/Wodonga)	2	2%
Northwest (e.g. Mildura)	1	1%
Southeast (e.g. Sale)	1	1%

Write your postal code here:

Comments 69

20,083,592	3178	Today, 10:54AM
20,082,990	7018	Today, 10:20AM
20,082,965	3337	Today, 10:20AM
20,082,960	3072	Today, 10:16AM
20,082,831	3150	Today, 10:18AM
20,080,519	2710	Today, 8:44AM
20,041,839	3153	Yesterday, 10:50AM
20,041,219	2903	Yesterday, 10:17AM
20,010,188	3074	Saturday, Feb 11th 3:48PM

20,005,918	3199	Saturday, Feb 11th 10:58AM
20,001,308	3199	Saturday, Feb 11th 7:49AM
19,981,136	3550	10:50PM
19,978,644	3463	Friday, Feb 10th 6:57PM
19,978,350	3555	Friday, Feb 10th 6:18PM
19,977,748	3153	Friday, Feb 10th 5:18PM
19,976,924	3698	Friday, Feb 10th 3:14PM
19,976,855	3013	Friday, Feb 10th 1:31PM
19,976,590	3175	Friday, Feb 10th 2:36PM
19,976,516	3220	Friday, Feb 10th 2:26PM
19,976,360	3147	Friday, Feb 10th 2:09PM
19,976,228	2037	Friday, Feb 10th 1:55PM
19,976,200	3146	Friday, Feb 10th 1:31PM

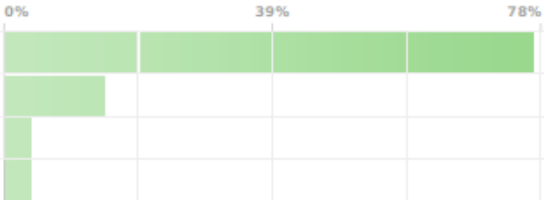
19,976,085	3356	Friday, Feb 10th 1:39PM
19,976,002	3037	Friday, Feb 10th 1:34PM
19,975,983	3088	Friday, Feb 10th 1:31PM
19,927,476	3130	Thursday, Feb 9th 9:16AM
19,801,119	3040	Tuesday, Feb 7th 9:08AM
19,776,587	3150	Monday, Feb 6th 3:17PM
19,776,443	3196	Monday, Feb 6th 3:24PM
19,772,884	3121	Monday, Feb 6th 10:02AM
19,772,629	3055	Monday, Feb 6th 9:47AM
19,771,062	3030	Monday, Feb 6th 7:53AM
	3216	Saturday, Feb 4th 2:54PM

19,570,594	3055	Tuesday, Jan 31st 7:09PM
19,569,758	3199	Tuesday, Jan 31st 5:54PM
19,569,405	3280	Tuesday, Jan 31st 5:14PM
19,566,742	3202	Tuesday, Jan 31st 1:21PM
19,561,322	3658	Tuesday, Jan 31st 10:10AM
19,540,338	3199	Monday, Jan 30th 8:40PM
19,528,740	3079	Monday, Jan 30th 10:00AM
19,528,529	3910	Monday, Jan 30th 9:48AM
19,494,428	3073	Sunday, Jan 29th 8:03AM
19,471,183	3029	Saturday, Jan 28th 4:17PM
19,462,620	3064	Saturday, Jan 28th 10:50AM
19,461,794	3690	Saturday, Jan 28th 10:27AM
19,455,700	3058	Saturday, Jan 28th 7:54AM
19,407,976	3029	Friday, Jan 27th 7:45PM
19,405,943	3131	Friday, Jan 27th 6:50PM
19,405,072	3930	Friday, Jan 27th 6:23PM

19,404,408	3134	Friday, Jan 27th 5:54PM
19,404,381	3150	Friday, Jan 27th 5:56PM
19,404,161	3175	Friday, Jan 27th 5:44PM
19,401,553	3185	Friday, Jan 27th 3:25PM
19.398.791	3101	Friday, Jan 27th 12:50PM
19,397,488	3199	Friday, Jan 27th 11:35AM
19,396,830	3040	Friday, Jan 27th 11:51AM
19,396,421	3141	Friday, Jan 27th 10:52AM
19,395,175	3153	Friday, Jan 27th 11:06AM
19,395,012	3199	Friday, Jan 27th 10:55AM
19,393,923	3805	Friday, Jan 27th 10:03AM
19,393,863	3977	Friday, Jan 27th 10:01AM
19,392,993	3047	Friday, Jan 27th 9:27AM
19,392,927	4305	Friday, Jan 27th 9:20AM
19,392,830	3216	Friday, Jan 27th 9:17AM
19,392,661	3172	Friday, Jan 27th 9:11AM
19,392,642	Queanbeyan NSW 2620	Friday, Jan 27th 9:12AM
19,392,586	3131	Friday, Jan 27th 9:13AM
19,392,355	3054	Friday, Jan 27th 9:06AM
19,392,115	3131	Friday, Jan 27th 9:02AM

Question 06 — Where do you live: (*Mandatory*)

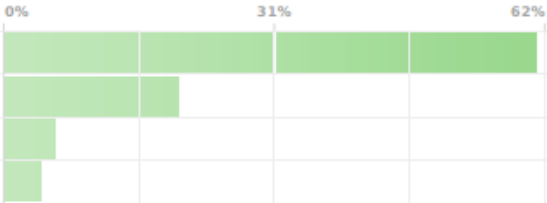
Answers: 101 (100%) | Skips: 0 (0%)



	COUNT	PERCENT
City	78	77.23%
Country, in a town (e.g. Ballarat, Bendigo)	15	14.85%
I prefer not to answer	4	3.96%
Country, very small town or a farm	4	3.96%

Question 07 — Were you: (*Mandatory*)

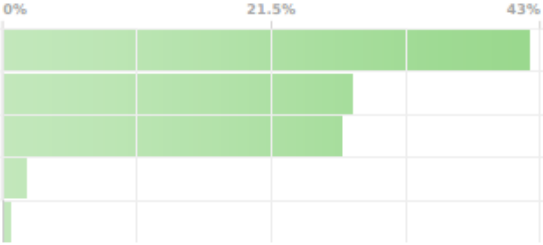
Answers: 101 (100%) | Skips: 0 (0%)



	COUNT	PERCENT
Born deaf	62	61.39%
Went deaf between 2-12 years old	20	19.8%
I am hearing	6	5.94%
40-59 years old	4	3.96%
Went deaf between 13-19 years old	4	3.96%
20-30 years old	3	2.97%
I prefer not to answer	1	0.99%
60+ years old	1	0.99%

Question 08 — Do you have access to the Internet: (*Mandatory*)

Answers: 101 (100%) | Skips: 0 (0%)



	COUNT	PERCENT
At home	92	42.4%
At work	61	28.11%
On a mobile phone	59	27.19%
Other Option	4	1.84%
I do not have access to the Internet	1	0.46%

Other Responses

Answers: 4

19,569,758	Tafe	Tuesday, Jan 31st 5:54PM
19,569,405	iPad	Tuesday, Jan 31st 5:14PM
19,494,428	fax	Sunday, Jan 29th 8:03AM
19,462,620	local library	Saturday, Jan 28th 10:50AM

Question 09

I have access to: (*Mandatory*)

Answers 101 (100%) Skips 0 (0%)

	COUNT	PERCENT
Email	99	18.33%
SMS	95	17.59%
Skype (or other type of Skype like ooVoo)	69	12.78%
Facebook	68	12.59%
IM (Instant Messaging/MSN)	50	9.26%
Fax	45	8.33%
TTY	43	7.96%
Twitter	27	5%
Video Chatting on mobile phone	23	4.26%
Videophone	13	2.41%
Other Option	8	1.48%

Other Responses

Answers 8

20,015,131	subtitles on digital tv	Saturday, Feb 11th 11:05PM
20,005,918	National Relay Service	Saturday, Feb 11th 10:58AM
19,978,350	Volume enhanced phone, captioned telephone	Friday, Feb 10th 6:18PM
19,927,476	None	Thursday, Feb 9th 9:16AM
19,411,856	National Relay Service	Friday, Jan 27th 9:10PM
19,397,416	Captel phone	Friday, Jan 27th 11:59AM
19,393,863	Captioned telephone	Friday, Jan 27th 10:01AM
19,392,993	CapTel phone	Friday, Jan 27th 9:27AM

Question 10

How often do you use the following: (*Mandatory*)

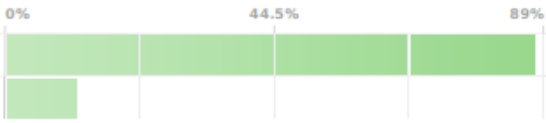
Answers: 101 (100%) Skips: 0 (0%)

	I DO NOT USE THIS	DAILY	WEEKLY	MONTHLY	EVERY FEW MONTHS
TTY	**58**	4	11	10	18
Email	1	**93**	4	2	1
Fax	**47**	4	18	12	20
SMS	3	**94**	4	0	0
IM (Instant Messaging/MSN)	**39**	30	18	8	6
Videophone	**80**	3	10	4	4
Video Chatting on mobile phone	**71**	5	9	10	6
Skype (or other type of Skype like ooVoo)	**29**	14	28	19	11
Facebook	29	**55**	13	2	2
Twitter	**71**	16	7	1	6

Question 11

Do you use VRI (video relay interpreting): (*Mandatory*)

Answers: 101 (100%) Skips: 0 (0%)



	COUNT	PERCENT
No	**89**	88.12%
Yes	**12**	11.88%

Question 12

Please explain why you do or do not use VRI: (*Mandatory*)

Answers **101** 100%

Skips **0** 0%

20,083,784	Don't really know how it will help me better	Today, 10:58AM
20,083,662	haven't needed to use it yet	Today, 10:26AM
20,083,592	Not sure how to use it	Today, 10:54AM
20,082,990	It cost expensively!	Today, 10:20AM
20,082,965	I have used it when i am off work but whilst I am at work there is not enough hours to access this service from home due to their limit hour useage. Maybe different if it was an option like TTY relay service? This is excellent service for my husband where his english is not good and is better at Auslan - face to face communicate works best for him.	Today, 10:20AM
20,082,960	For one to one meetings at work.	Today, 10:16AM
20,082,831	I can't go to your office for VRI as it takes my time.	Today, 10:18AM
20,080,519	Have no need for it, and don't know much about the service	Today, 8:44AM
20,041,839	When I do, I do it at home but not as often as Im faster on tty.	Yesterday, 10:50AM
20,041,219	no access	Yesterday, 10:17AM
20,040,845	Because I have to make an appointment	Yesterday, 10:08AM
20,040,796	Used twice - didnt like the idea of signing to the computer in open plan office when using VRI. So NRS is more discreet	Yesterday, 10:01AM
20,015,131	i have only dialup , can't afford broadband	Saturday, Feb 11th 11:05PM
20,012,703	Time with data and cost usage too high. Also, prefer to have the interpreter at the place where there is at least three people in the meeting so that I can interact.	Saturday, Feb 11th 6:40PM
20,010,188	little access, not alot of need	Saturday, Feb 11th 3:48PM
20,005,918	I am not sure how to use VRI and haven't been taught how to yet.	Saturday, Feb 11th 10:58AM
20,001,308	Not much useful yet	Saturday, Feb 11th 7:49AM
19,981,136	Because I am hard of hearing, I can still hear quite well with hearing aids	Friday, Feb 10th 10:50PM

19,978,844	I haven't had a go yet	7:21PM
19,978,644	Haven't got it.	Friday, Feb 10th 6:57PM
19,978,350	I sign but slowly and poorly and have sufficient hearing with hearing aids that I don't need it	Friday, Feb 10th 6:18PM
19,977,748	I dont know how to use it	Friday, Feb 10th 5:18PM
19,977,724	Not confidence to use video due fear of other people looking behind video	Friday, Feb 10th 5:13PM
19,976,924	I have a Cochlear Implant & can hear on the telephone.	Friday, Feb 10th 3:14PM
19,976,909	I have Skype and Emails and SMS is enough	Friday, Feb 10th 3:17PM
19,976,894	No need at the moment and not really sure what this is? is it to go back on the video and get it to come up in subtitles ?	Friday, Feb 10th 3:18PM
19,976,855	haven't had the need	Friday, Feb 10th 1:31PM
19,976,598	clear visual	Friday, Feb 10th 2:41PM
19,976,590	not suitable for type of things i do like work meetings	Friday, Feb 10th 2:36PM
19,976,545	No use for me to use this	Friday, Feb 10th 2:29PM

19,976,360	Do't know how to use it	Friday, Feb 10th 2:09PM
19,976,228	I never use VRI	Friday, Feb 10th 1:55PM
19,976,214	I have no idea how to use it	Friday, Feb 10th 1:46PM
19,976,200	I do not use VRI as I am very busy doing other things.	Friday, Feb 10th 1:31PM
19,976,192	Need to carry laptop around, dont have video camera on my work PC	Friday, Feb 10th 1:54PM
19,976,085	Accessing interpreters can be costly with travel costs living in the country. Where appropriate I used VRI. However the venues provided for VRI is not always suitable so I often use SKype interpreting.	Friday, Feb 10th 1:39PM
19,976,002	I dont have as much opportunity to use it. When the time arises I will use it.	Friday, Feb 10th 1:34PM
19,975,983	Do not need it for myself and have not YET had a need for it.	Friday, Feb 10th 1:31PM
19,928,038	Quality of interpreters isn't very good.	Thursday, Feb 9th 9:52AM
19,927,476	Not sure what this is...	Thursday, Feb 9th 9:16AM
19,801,119	haven't need too at this stage but would if a situation came up	Tuesday, Feb 7th 9:08AM

19,776,587	Not heard of it & unsure of its relevance....	3:17PM
19,776,443	Not needed for me.	Monday, Feb 6th 3:24PM
19,772,884	I can use a telephone	Monday, Feb 6th 10:02AM
19,772,629	use subtittles I haev not had the chance to learn sign language	Monday, Feb 6th 9:47AM
19,771,062	Have not got used to it yet. Getting around to learning a bit more.	Monday, Feb 6th 7:53AM
19,695,288	I do not use VRS because I am not good at Auslan	Saturday, Feb 4th 2:54PM
19,570,594	Immediate access to interpreting services than onsite interpreting services	Tuesday, Jan 31st 7:09PM
19,569,758	Easier to understand visual language and more visual contexts	Tuesday, Jan 31st 5:54PM
19,569,405	I don't really know what it is...	Tuesday, Jan 31st 5:14PM
19,566,742	I believe the VRI is to be connected to the computer and my computer at home is upstairs and is only on when I am using the computer. Found it more convenient at this stage to use Internet Relay Service.	Tuesday, Jan 31st 1:21PM
19,561,322	I am not too confident how to use them!	Tuesday, Jan 31st 10:10AM
19,540,338	i dont know how do it... i hope someone put video auslan explain i will understand this and how to do VRI	Monday, Jan 30th 8:40PM

19,537,143	Because I recieve not enough support from VicDeaf.	Monday, Jan 30th 5:05PM
19,533,403	vri is only call i can access to	Monday, Jan 30th 1:03PM
19,532,227	do not know about it	Monday, Jan 30th 12:19PM
19,530,898	Not needed to yet	Monday, Jan 30th 11:30AM
19,528,740	I prefer to use captioning or blue tooth on phone	Monday, Jan 30th 10:00AM
19,528,529	ease of use	Monday, Jan 30th 9:48AM
19,524,786	I haven't tried yet at the moment....	Monday, Jan 30th 6:50AM
19,494,428	cannot use during after hour as am working 6 days a weeks	Sunday, Jan 29th 8:03AM
19,471,183	don't know enough about it	Saturday, Jan 28th 4:17PM
19,470,594	I am partially deaf and use both Auslan and spoken/written English. To contact people via technology, I usually use email and SMS. Have not yet had the opportunity to use VRI.	Saturday, Jan 28th 3:45PM
19,464,970	Never try yet	Saturday, Jan 28th 12:15PM
19,464,241	dont have the device at home.	Saturday, Jan 28th 11:38AM

19,462,620	I don't know HOW!	Saturday, Jan 28th 10:50AM
19,461,794	No situation has arose where I required this service as yet.	Saturday, Jan 28th 10:27AM
19,455,700	I usually not use on VRI as just new to me.	Saturday, Jan 28th 7:54AM
19,411,856	English is my first language, and whilst I can use Auslan, I prefer real-time captioning for most communication.	Friday, Jan 27th 9:10PM
19,407,976	Have no need for VRI yet.	Friday, Jan 27th 7:45PM
19,405,943	Save my fingers to type	Friday, Jan 27th 6:50PM
19,405,072	Because I never heard about this.	Friday, Jan 27th 6:23PM
19,404,408	Never use it. i dont know how use it.	Friday, Jan 27th 5:54PM
19,404,381	not sure how to use	Friday, Jan 27th 5:56PM
19,404,161	not yet try if important for my job meeting it would be great but not yet suit that as far i know on on my work place	Friday, Jan 27th 5:44PM
19,401,553	I'm not deaf... I think you should have clarified if this is for people who are DEAF or & hearing impaired- I have moderate hearignn impairment and rely on hearign aides- my loss has been gradual and seems to be continuing.... so i don't use video nor Auslan.. which si what I'd need to use for Video interpreting... iN the future open captions is what I'll need, as no-one I know or work with uses Auslan.	Friday, Jan 27th 3:25PM

19,399,355	Haven't been yet educated to know exactly what this is.	Friday, Jan 27th 1:16PM
19,398,791	to new to me prefer wait a little longer as so many technology around that I can use. VRI is not my top priorty at the moment.	Friday, Jan 27th 12:50PM
19,397,488	I don't have the set up that required to use the VRI. I have tried twice but couldn't get through.. I'm not expert on technology.	Friday, Jan 27th 11:35AM
19,397,416	I am not a signer, I can still use a telephone but prefer a caption phone	Friday, Jan 27th 11:59AM
19,396,830	I don't know what it is.	Friday, Jan 27th 11:51AM
19,396,421	I'm oral deaf and don't want to use it	Friday, Jan 27th 10:52AM
19,395,980	Limited hours	Friday, Jan 27th 11:33AM
19,395,553	Not available here	Friday, Jan 27th 11:21AM
19,395,175	I don't use these type of technology as use the relay service as my langugage is very good	Friday, Jan 27th 11:06AM
19,395,012	Connection and bandwidth in the area - so poor	Friday, Jan 27th 10:55AM
19,395,011	I am happy with the current National Relay Service's text-voice-text system.	Friday, Jan 27th 10:53AM

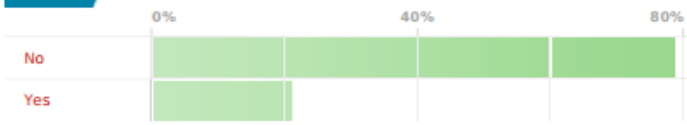
19,394,892	Have not found it to be necessary	10:37AM
19,394,265	I not used VRI. I would like to try this service, if it is right suit me.	Friday, Jan 27th 10:15AM
19,393,923	I use TTY relay services as i find it is more convienent for me instead of signing. Im not very good in signing... Typing was easier for me.... Thank you.	Friday, Jan 27th 10:03AM
19,393,863	Internet speeds at work not sufficient via mobile internet. Jnable to connect via work network due to firewall.	Friday, Jan 27th 10:01AM
19,393,691	Haven't use it before.	Friday, Jan 27th 9:55AM
19,392,993	I do not have Auslan.	Friday, Jan 27th 9:27AM
19,392,927	Because I have never try it and I have little use in sign language.	Friday, Jan 27th 9:20AM
19,392,830	I dont really need it as I have own interpreters I want.	Friday, Jan 27th 9:17AM
19,392,661	Speed on Data is not the best	Friday, Jan 27th 9:11AM
19,392,642	not yet VRI	Friday, Jan 27th 9:12AM
19,392,586	Face to face communcation give me more comfortable better than NRS with my first language Auslan. In future I should not use VRI if the avatar appears on the screen	Friday, Jan 27th 9:13AM
19,392,355	I use NRS more	Friday, Jan 27th 9:06AM
19,392,115	Just started using it and found it so useful - plan to use it more often.. Worthwhile for me as a Deaf person...	Friday, Jan 27th 9:02AM

Question 13

Do you know about Microsoft Lync: (*Mandatory*)

Answers **101** 100%

Skips **0** 0%



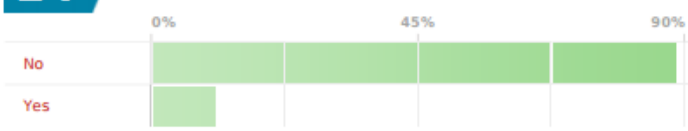
	COUNT	PERCENT
No	**80**	79.21%
Yes	**21**	20.79%

Question 14

Do you know about Signing Avatars (see link): (*Mandatory*)

Answers **101** 100%

Skips **0** 0%



	COUNT	PERCENT
No	**90**	89.11%
Yes	**11**	10.89%

Question 15

Which is your favourite technology: (*Mandatory*)

Answers: 101 (100%)
Skips: 0 (0%)

	COUNT	PERCENT
SMS	42	41.58%
Email	32	31.68%
Skype (or other type of Skype like ooVoo)	9	8.91%
Other Option	8	7.92%
Video Chatting on mobile phone	4	3.96%
IM (Instant Messaging/MSN)	4	3.96%
Videophone	2	1.98%
Fax	0	0%
TTY	0	0%

Other Responses

Answers: 8

19,976,214	searching the internet	Friday, Feb 10th 1:46PM
19,927,476	None	Thursday, Feb 9th 9:16AM
19,528,740	captioning	Monday, Jan 30th 10:00AM
19,461,794	can't really choose...love SMS, email & facebook	Saturday, Jan 28th 10:27AM
19,411,856	Real-time, remote captioning (such as CapTel)	Friday, Jan 27th 9:10PM
19,395,011	Internet relay service via PC	Friday, Jan 27th 10:53AM
19,393,863	Captioned telephone	Friday, Jan 27th 10:01AM
19,392,830	Facebook	Friday, Jan 27th 9:17AM

Question 16

Please explain why this is your favourite technology:

Answers 95 (94%) Skips 6 (6%)

20,083,784	convenience and ease of use, requires less bandwidth and time to set up a session	Today, 10:58AM
20,083,662	easy to use and I can have a record of communication and respond when I want to	Today, 10:26AM
20,083,592	Instant access and responses...	Today, 10:54AM
20,082,990	It better expression face!	Today, 10:20AM
20,082,965	real time chat - more clearer to explain.	Today, 10:20AM
20,082,960	Visual & fluent - only if internet speed is good	Today, 10:16AM
20,082,831	I always with my mobile all the time so it's easy for me to access anyone.	Today, 10:18AM
20,080,519	Easy to use, readily accessible, and most hearing people know how to use it too	Today, 8:44AM
20,041,839	can see face to face and easier to explain to some deaf people who cant read good plus showing things..	Yesterday, 10:50AM
20,041,219	easy	Yesterday, 10:17AM
20,040,796	Easily accessible to everyone and can be used anywhere at anytime	Yesterday, 10:01AM
20,015,131	an idiot box is a bit big and heavy to put in your pocket and mobile video calls in australia are $4:50 per minute	Saturday, Feb 11th 11:05PM
20,012,703	Able to see while communicating anywhere and anytime.	Saturday, Feb 11th 6:40PM
20,010,188	common, easy, wide access to wide variety	Saturday, Feb 11th 3:48PM
20,005,918	because this is the most easiest way of technology for me.	Saturday, Feb 11th 10:58AM
20,001,308	You can keep in computer's external filing system and review them later	Saturday, Feb 11th 7:49AM
19,981,136	Because it's cheap, simple and fast	Friday, Feb 10th 10:50PM
19,978,844	To get more easy to check the message and very useful for urgent or emergency	Friday, Feb 10th 7:21PM
19,978,644	It's about all I have and thus use.	Friday, Feb 10th 6:57PM
19,978,350	It lets me communicate on an equal basis with my correspondent and doesn't create any hearing issues	Friday, Feb 10th

19,977,748	it is quick	Friday, Feb 10th 5:18PM
19,977,724	send message and know will get response	Friday, Feb 10th 5:13PM
19,976,924	Because I can contact people no matter where they are.	Friday, Feb 10th 3:14PM
19,976,909	I can explain more of what I need to say	Friday, Feb 10th 3:17PM
19,976,894	easy to access most of the time, SMS is the next, but will soon have to upgrade mobile phone because it is getting behind with the times!	Friday, Feb 10th 3:18PM
19,976,855	easy, quick, everyone with a mobile uses it, not just deaf/hard of hearing.	Friday, Feb 10th 1:31PM
19,976,598	immediate reply	Friday, Feb 10th 2:41PM
19,976,590	very handy to contact family etc	Friday, Feb 10th 2:36PM
19,976,545	Faster contacts	Friday, Feb 10th 2:29PM
19,976,516	In case of emergency you can contact certain people!	Friday, Feb 10th 2:26PM
19,976,360	Because i use every day find newletter update	Friday, Feb 10th 2:09PM

19,976,214	I am usually looking up websites of my favourite hobby called papercraft/cardmaking etc. Also sometimes I buy online from those websites saving me trips to the shops.	Friday, Feb 10th 1:46PM
19,976,200	For better communication between deaf and hearing people.	Friday, Feb 10th 1:31PM
19,976,192	Easy to send and receive wherever I go.. It's like that I am contactable 24/7	Friday, Feb 10th 1:54PM
19,976,085	Quick and easy instant and real time communication in the language of my choice (English). I can speak in a CapTel phone but not confident with the timelag in captions and listening to the speaker.	Friday, Feb 10th 1:39PM
19,976,002	Convenient, easy, simple fast.	Friday, Feb 10th 1:34PM
19,975,983	Quick easy can save and go back to it, have a copy for reference	Friday, Feb 10th 1:31PM
19,928,038	Short, sweet and mobile! Very accessible almost anywhere.	Thursday, Feb 9th 9:52AM
19,927,476	N/A	Thursday, Feb 9th 9:16AM
19,801,119	easy and conveniant	Tuesday, Feb 7th 9:08AM
19,776,587	The ease it enables me to stay in contact with my many of my friends locally & abroad	Monday, Feb 6th 3:17PM
19,776,443	Can read and answer at time of my choosing.	Monday, Feb 6th 3:24PM
19,772,884	because	Monday, Feb 6th 10:02AM

19,772,629	you can see and do anything on the go	Monday, Feb 6th 9:47AM
19,771,062	Its quick and ready to answer. Plus i can communicate with hearing people. With Skype or video call, only to signing person.	Monday, Feb 6th 7:53AM
19,695,288	Because I can talk to both Deaf and Hearing friends	Saturday, Feb 4th 2:54PM
19,570,594	Can Auslan on the videocall for immediate chat.	Tuesday, Jan 31st 7:09PM
19,569,758	More Visual language	Tuesday, Jan 31st 5:54PM
19,569,405	Quick and easy and I don't have to try to hear anyone speaking	Tuesday, Jan 31st 5:14PM
19,566,742	Because it's accessible 24 hours a day wherever you are and you can response quickly. With emails which I love, it's harder to use email on the small iPhone.	Tuesday, Jan 31st 1:21PM
19,561,322	It is easy to use and always check emails daily.	Tuesday, Jan 31st 10:10AM
19,540,338	sms very handy contact to ppl... but i perfer oovoo and skype more clear understand in auslan some ppl type sms hard to understand depend who	Monday, Jan 30th 8:40PM
19,537,143	Because it's much more quickly to send/recieve when I'm not using my laptop computer or at home if it's urgent.	Monday, Jan 30th 5:05PM
19,533,403	i have my iphone with me everyday!!!	Monday, Jan 30th 1:03PM

19,530,898	Easy for me	Monday, Jan 30th 11:30AM
19,528,740	Access to english language	Monday, Jan 30th 10:00AM
19,528,529	Total communication option whereas others are limited in capabilities	Monday, Jan 30th 9:48AM
19,524,786	because it reads proper in computer and easier to access it..pictures and bills send into emails ...and can save in it ...	Monday, Jan 30th 6:50AM
19,494,428	simple and straight away,	Sunday, Jan 29th 8:03AM
19,471,183	instant accessibility	Saturday, Jan 28th 4:17PM
19,470,594	It is easy, quick, accessible to most people. I can confidently express myself clearly. Replies are usually clear too, but if they are not, it is straightforward to clarify further with no restrictions on word limit or costs.	Saturday, Jan 28th 3:45PM
19,464,970	I have no idea why but I do often use everyday...	Saturday, Jan 28th 12:15PM
19,464,241	It is more easier to contact businesses or organisations and other networks that doesnt have these technology or have not got any deaf awarness.	Saturday, Jan 28th 11:38AM
19,462,620	easy to communication	Saturday, Jan 28th 10:50AM
19,461,794	They all enable me to keep in contact with the whole world, easily and quickly.	Saturday, Jan 28th 10:27AM

19,455,700	Obivously really simple contact with sms coz of on this mobile communctation likely that way as I think anyway.	Saturday, Jan 28th 7:54AM
19,411,856	Can be accessed using the iPhone / iPad and this is the same technology that everybody else has (i.e. it isn't different like TTY's were) and so much can be achieved with different apps and the Internet these days.	Friday, Jan 27th 9:10PM
19,407,976	Easy to use,	Friday, Jan 27th 7:45PM
19,405,943	Save my life less stress	Friday, Jan 27th 6:50PM
19,405,072	Becuase I chat with friends. that easy communication..	Friday, Jan 27th 6:23PM
19,404,408	it is quick and easy to communicate with hearing and deaf people.	Friday, Jan 27th 5:54PM
19,404,381	simple and widely used	Friday, Jan 27th 5:56PM
19,404,161	useful for my family not yet knows auslan	Friday, Jan 27th 5:44PM
19,401,553	With my moderate hearing loss, there are times when i find SMS wonderful to suplement my phone use.	Friday, Jan 27th 3:25PM
19,399,355	Much more convenience and easy access to communicate	Friday, Jan 27th 1:16PM
19,398,791	Email is easier and no urgent but if urgent then use sms. would like to use vidoe chatting on mobile phone but reckon wait til 4G then everything would be fantastic for video chatting on mobile.	Friday, Jan 27th 12:50PM

19,397,488	Email is my favourite technology because it has some significant values to use and remember of our things in our lives. SMS is another favourite as to stay in touch with our friends and family is very important to me too.	Friday, Jan 27th 11:35AM
19,397,416	Easy to read what people say	Friday, Jan 27th 11:59AM
19,396,830	Visual	Friday, Jan 27th 11:51AM
19,396,421	Always love the Ipad/Computer which allows you to access everything	Friday, Jan 27th 10:52AM
19,395,980	I can email from my computer, typing with my keyboard rather than on a small screen. I have access to other files and things on my computer which always come in handy.	Friday, Jan 27th 11:33AM
19,395,553	Easier to use Skype than to use SMS	Friday, Jan 27th 11:21AM
19,395,012	More visual communications with pure Auslan and real/rich Deaf culture	Friday, Jan 27th 10:55AM
19,395,011	it is quick and easy to use, and I can save conversations for future use. I would prefer to use video technology for close friends and family who can sign though... haven't tried it yet, as not everyone is familiar enough with technology to do so.	Friday, Jan 27th 10:53AM
19,394,892	SMS - quick response Also like e-mail if more detail & don't need quick response Just started using Skype & webcam - great	Friday, Jan 27th 10:37AM
19,393,923	SMS is easily access and quick for contact someone in very urgent and important matter.	Friday, Jan 27th 10:03AM

19,393,863	Quick and easy to use, can be used in any setting	10:01AM
19,393,691	It is very easier to keep in touch with family/friends.	Friday, Jan 27th 9:55AM
19,392,993	Everyone uses it.	Friday, Jan 27th 9:27AM
19,392,927	Because it is an asset to keep in touch daily and read long communications especially applying for jobs, enquires to any customer services, and I used it everyday. Its the only technology I have in the household at present. Other technologies I dont have access to or fiancial to afford it.	Friday, Jan 27th 9:20AM
19,392,830	Free to talk to anyone, anytime.	Friday, Jan 27th 9:17AM
19,392,661	As I work in and out of the Office everyday and that was why I prefer to use emails	Friday, Jan 27th 9:11AM
19,392,586	i using sms daily and receives SMS daily from Deaf and hearing worlds	Friday, Jan 27th 9:13AM
19,392,355	Easy and quick, can be used anytime and anywhere. Generally get a quick response. Extremely useful.	Friday, Jan 27th 9:06AM
19,392,115	Easily communicate with "nearly" everyone.. Felt that I have my independant with SMS...	Friday, Jan 27th 9:02AM

Question 17

What do you use each technology for: (*Mandatory*)

Answers **102** 100%

Skips **0** 0%

	I DO NOT USE THIS TECHNOLOGY	BUSINESS	PERSONAL	BOTH BUSINESS AND PERSOANL
TTY	**52**	11	15	24
Email	1	2	18	**81**
Fax	**41**	28	13	20
SMS	3	1	25	**73**
IM (Instant Messaging/MSN)	**39**	6	31	26
Videophone	**81**	5	10	6
Video Chatting on mobile phone	**70**	1	24	7
Skype (or other type of Skype like ooVoo)	30	1	**43**	28
Facebook	30	0	**60**	12
Twitter	**71**	3	22	6

Question 18

Why do you use each technology: (*Mandatory*)

Answers: 102 (100%) Skips: 0 (0%)

	I DO NOT USE THIS TECHNOLOGY	I HAVE IT	IT IS CHEAP	IT IS EASY TO USE
TTY	**55**	34	3	21
Email	1	52	36	**86**
Fax	**46**	35	8	31
SMS	3	50	32	**87**
IM (Instant Messaging/MSN)	39	**42**	22	42
Videophone	**82**	14	1	9
Video Chatting on mobile phone	**70**	22	4	20
Skype (or other type of Skype)	29	**48**	31	44
Facebook	29	**52**	23	48
Twitter	**71**	24	6	15

Question 19

Why do you NOT use each technology: (*Mandatory*)

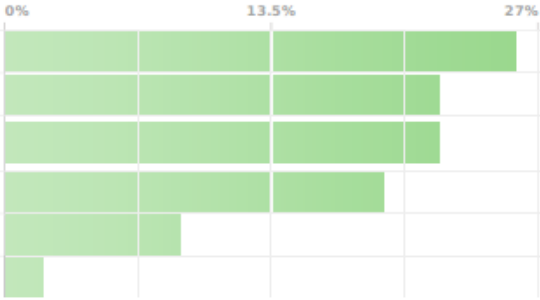
Answers: 102 (100%) Skips: 0 (0%)

	I DO USE THIS TECHNOLOGY	I DO NOT HAVE IT	TOO EXPENSIVE	NOT EASY TO USE	I DO NOT KNOW WHAT IT IS
TTY	**54**	39	3	12	2
Email	**96**	1	1	6	1
Fax	**64**	31	2	8	2
SMS	**93**	3	4	3	1
IM (Instant Messaging/MSN)	**62**	20	3	9	10
Videophone	24	**51**	19	14	12
Video Chatting on mobile phone	32	**37**	17	13	12
Skype (or other type of Skype like ooVoo)	**70**	17	3	11	5
Facebook	**74**	17	0	10	4
Twitter	39	**47**	1	12	10

Question 20

Which of the following are most important for you to have in a technology: (*Mandatory*)

Answers 102 (100%) Skips 0 (0%)



	COUNT	PERCENT
Easy to use	70	26.02%
Low cost	59	21.93%
Having the technology on a phone or mobile device (iPad, tablet, etc.)	59	21.93%
Having the technology on a computer or laptop	52	19.33%
Vidoe so I can see the other person	24	8.92%
Other Option	5	1.86%

Other Responses

Answers 5

20,015,131	having only 10% vision as well as profoundly deaf and trying to live on $250 per week makes tty unafordable	Saturday, Feb 11th 11:05PM
20,012,703	No charge (NDIS covers it.)	Saturday, Feb 11th 6:40PM
19,776,587	Portability	Monday, Feb 6th 3:17PM
19,570,594	flexible mobility	Tuesday, Jan 31st 7:09PM
19,407,976	Readily accessible	Friday, Jan 27th 7:45PM

Question 21

Which services do you use from Vicdeaf the most: (*Mandatory*)

Answers 102 (100%) Skips 0 (0%)

	COUNT	PERCENT
Interpreting	56	35.22%
I do not use Vicdeaf's services	27	16.98%
Other Option	14	8.81%
Case manager	12	7.55%
Duty worker	11	6.92%
Auslan courses	11	6.92%
Counselling services	10	6.29%
Relay interpreter	9	5.66%
VRI (video relay interpreting)	6	3.77%
Notetaking	3	1.89%

Other Responses

Answers 14

20,083,662	attended VRI training	Today, 10:26AM
20,041,839	im carer myself for vicdeaf.	Yesterday, 10:50AM
20,015,131	email news and battery disposal and bimonthly newsletter	Saturday, Feb 11th 11:05PM
19,976,894	Currently	Friday, Feb 10th 3:18PM
19,928,038	Deaf Professionals Network, Leadership	Thursday, Feb 9th 9:52AM
19,927,476	Sounds Unlimited- hard of hearing social group	Thursday, Feb 9th 9:16AM
19,776,587	Hearing aid supply & service	Monday, Feb 6th 3:17PM
19,566,742	Going to Workshops/seminars	Tuesday, Jan 31st 1:21PM
19,461,794	rarely use, but when I do, usually an interpreter service	Saturday, Jan 28th 10:27AM
19,401,553	None of the above, you have left of the two VicDeaf services, that I use ie HEAR service & Senswide	Friday, Jan 27th 3:25PM

19,396,830	Hearing aid help, batteries etc	11:51AM
19,394,892	Devices advice	Friday, Jan 27th 10:37AM
19,392,927	Employment and newletters	Friday, Jan 27th 9:20AM
19,392,642	AL-Live with an iPad for meeting	Friday, Jan 27th 9:12AM

Question 22

Where do you go to get information: (*Mandatory*)

Answers 102 (100%) Skips 0 (0%)

	COUNT	PERCENT
Vicdeaf's website	79	37.26%
Internet (Google)	49	23.11%
Friends	45	21.23%
Family members	23	10.85%
Other Option	13	6.13%
None	3	1.42%

Other Responses

Answers 13

20,040,845	Newlsetter	Yesterday, 10:08AM
20,015,131	Wikipedia although 50% of the info is wrong and the rest is just fairy storys	Saturday, Feb 11th 11:05PM
19,978,644	Phone book, Church.	Friday, Feb 10th 6:57PM
19,927,476	local library	Thursday, Feb 9th 9:16AM
19,776,587	Vicdeaf's monthly news sheet	Monday, Feb 6th 3:17PM
19,771,062	Work Place as I work in deaf field.	Monday, Feb 6th 7:53AM
19,570,594	Vicdeaf's e-news	Tuesday, Jan 31st 7:09PM
19,528,740	information about what?	Monday, Jan 30th 10:00AM

19,471,183	Deaf Victoria website	Saturday, Jan 28th 4:17PM
19,411,856	Twitter	Friday, Jan 27th 9:10PM
19,401,553	what type of information do you mean	Friday, Jan 27th 3:25PM
19,396,421	Australian Hearing	Friday, Jan 27th 10:52AM
		Friday, Jan 27th

19,395,980	Facebook	11:33AM

Question 23 **Please provide any additional comments:**

Answers **33** 32%

Skips **69** 68%

20,082,990	all people do not want to spend every things because Disablilty should get free technology all times. all people by hearing lucky get few things that is really not much spending!	Today, 10:20AM
20,082,965	currently have problem using tty at work. Have been told not to use it for time being becuase it is too loud... there is a problem with q19 - for the technology I use it wont allow blank so I have to tick something - havent used whilst I use it or it wont submit the survey. $50 bucks pls as you read this info :)	Today, 10:20AM
20,082,525	I have an Apple laptop and iPad2. I get frustrated for unable to get an access through NRS IPRelay for both laptop and iPad2. I have asked for help from several people but no one can understand why it is not working properly for Apple products.	Today, 9:55AM
20,041,839	Would love to have NRS to come back on MSN as I can use on my iphone to communicate with people (business that they dont provide you mobile numbers) when Im not at home or work. I do it for emergencies only otherwise I would wait to go home to use TTY. It can be frustrating when you are stuck and have an appt and would like to contact the business person that you are running late or change times etc...	Yesterday, 10:50AM
20,040,796	There are so many potential technology available - its matter of whether allother Deaf people is using the same technology. Only limited people use twitter while many others are not familiar. I find it hard to use and didnt want to get hook into time-consuming application.	Yesterday, 10:01AM
20,015,131	2012 and i am still getting abused and threatend for being unable to use phone like apia insurance and council	Saturday, Feb 11th 11:05PM

20,012,703	I would like to use video chatting if no charge (ie NDIS personal fund will able to cover it) and also NBN rollout would benefit a lot. Including above I would like to use VRI if there is no booking required or time limit because in workplaces they come to talk to me anytime or take me in the meeting when there's no advance notice. Would like interpreter to be ready anytime and also have some priority system, if VRI not available or busy then have live captioner ready or in personal preferences. 24/7 service. If I was told in advance, any interpreter available via booking and if none use VRI and if none use live captioner.	Saturday, Feb 11th 6:40PM
20,005,918	VicDeaf are excellent service provider for Deaf and Hearing Impaired people, i have used their Interpreting and Notetaking services for a few years now and they are mostly alot reliable and always keep client info to themsleves.	Saturday, Feb 11th 10:58AM
20,001,308	n/a	Saturday, Feb 11th 7:49AM
19,978,350	Nil	Friday, Feb 10th 6:18PM
19,976,924	I get VICDEAF Newsletter &info by email.	Friday, Feb 10th 3:14PM
19,976,360	I never visit cos they are rudes people never again visit them	Friday, Feb 10th 2:09PM
19,976,214	It would be great if we had a workshop about videophone.	Friday, Feb 10th 1:46PM
19,976,200	Nil.	Friday, Feb 10th 1:31PM
19,927,476	Some technology I am familiar with; however, since retirement, I do not have access to computers, faxes, etc.	Thursday, Feb 9th 9:16AM
19,801,119	Q19 I don't use and refuse to use face book as I feel it is a tooll for Bullies	Tuesday, Feb 7th 9:08AM
19,776,587	Vicdeaf appear more "user" friendly & helpful, there is more focus on helping with hearing difficulties rather than just selling a particular brand of hearing aids.	Monday, Feb 6th 3:17PM
19,771,062	I work in the deaf community, therefore important for me to know up to date technology to educate others who comes to me. I got IPhone recently and loving it more and more. But the only thing im disappointed is i am unable to use Video call to other person who does not have Iphone. Not all of them have Internet connection on their mobile. Skype can be used if their mobile has internet connection. So SMS is the best way.	Monday, Feb 6th 7:53AM
19,695,288	I found Age a problem in learning Auslan due to ill heath	Saturday, Feb 4th 2:54PM
19,569,405	Would love to see services and technology for those of us who have profound deafness but who communicate without Auslan. One of my biggest gripes is captioning at the cinema...if most DVD's have captions, how come all movies in the cinema can't use closed captions?	Tuesday, Jan 31st 5:14PM
19,540,338	sometime i did not think ask vicdeaf bec i dont know what it for... but i know deaf staff work there ... or workshop anything special i will come... but never ask for something maybe not enough information what vicdeaf for.....help people or what	Monday, Jan 30th 8:40PM

19,537,143	It's much easier to know which events to attend and how cost to get there, accommodation if for both business or personal reasons. I will try to get there when I can.	Monday, Jan 30th 5:05PM
19,524,786	Not really at the moment as every year it changes new technology ...Still continue...and always give people a good images	Monday, Jan 30th 6:50AM
19,461,794	Need an SMS emergency service. In my current living situation if something were to happen to my partner and he needed an ambulance, I would have to hope neighbours are home (only have 2 neighbours where we live) as TTY is problematic with ADSL splitters and can't hear on mobile/home phone.	Saturday, Jan 28th 10:27AM
19,411,856	N/A	Friday, Jan 27th 9:10PM
19,401,553	as I mentioned earlier the survey si unclear if it's for anyone with hearign loss or only those with profound loss/deaf. Also is this exclusively for AUSLAN users or anyone inclkuding AUSLAN users. Auslan is important for the Auslan community- those with profund loss from an early age- but useless for thsoe of us who aquire our hearing loss later in life or gradual loss as we ge tolder.	Friday, Jan 27th 3:25PM
19,397,488	Having a technology is an amazing because it can gives one a freedom of using it to remain in touch with your friends and family as well as businesses, too. It will give me more independent to use the technology. Without the technology, I would be stuck at home or doing the most difficult - manual contact e.g. drive down to the place to visit but no one is at home!.	Friday, Jan 27th 11:35AM
19,397,416	Why no Captel included in this survey? I know deaf people who use it.	Friday, Jan 27th 11:59AM
19,396,830	Would be interested in learning about other mentioned technologies. Thank you	Friday, Jan 27th 11:51AM
19,395,011	Internet Relay service should be included in the questionnaire, as this is another use of technology (Computers, instead of TTY). I find the PC easier to use than the TTY (old and clunky, not portable)	Friday, Jan 27th 10:53AM
	If the technology was great and easier for deaf people to use eg. tty relay services on mobile phone, vri on mobile phone, emergency numbers ..on mobile but there are some things we cannot use du e to the	Friday, Jan 27th
19,393,923	mobile phone coverage..... It would be great if we had flexibility and greater coverage on all mobiles for deaf people.	10:03AM
19,392,661	Would like to use VRS if the data speed is available at Vicdeaf	Friday, Jan 27th 9:11AM
19,392,355	Regarding to when I became Deaf - there wasn't an option to select from birth to 2 years old. I became Deaf at 7 months old.	Friday, Jan 27th 9:06AM

APPENDIX D – Transcript of Focus Group

February 15, 2012

What types of communication tech to you use on a regular basis?

Person 1: Skype with VRS or online NRS, SMS, Email, Facebook, any online social media.

Person 2: I separate it into what I use in my personal life and what I use for work. I use a program like MSN with my job with the Victorian government. I also use SMS, Email, fax.

Person 1: I think all deaf used fax a lot, but not anymore. It's become obsolete. I like Facetime, but the wifi access is not so great, so it's not as good. Wireless is not available in Melbourne everywhere.

Person 4: We use a program called Lync with Vicdeaf. It has online chat and video.

Person 1: I use another other app called Tango. It lets you call someone via telephone but without having to login to the online tech like Skype does, but it's not always available.

Do you have readily available access to Internet?

Person 1: At work, at home, at a cafe or restaurant or at Vicdeaf I have access to wireless, but in Australia and in Melbourne it is hard to access. I do a lot on 3G, but have to be careful with data use.

Person 5: I use so much data and spend too much money. I'm really conscious of the cost and have to budget money accordingly.

Person 3: I use my smartphone now, and don't use laptop at all. It is a portable device that I can have with me everywhere and it's easy to take out.

Person 1: But quality is an issue with the smartphone. On the small screen Skype is questionable, so I need laptop for that. Facetime is limited because you need wifi.

What is the one technology you use more than any other?

Person 5: Facetime

Person 3: SMS for me. It's easy because you carry phone with you anywhere.

Person 1: I prefer having conversations in sign language. If the quality were good enough I would talk with my friends and family only on video.

Person 3: Video is behind the time in Australia. In America they are more available and better service.

Person 2: I hear that the government is rolling out a new program to provide better Internet. I prefer face-to-face Auslan over video.

Person 1: It depends on who you are talking to. If I'm talking to my family of friend then I will directly video chat with them. If I am videoing someone who doesn't sign, I still want to be able to see them and connect with that person even if I need and interpreter. I don't want to just be looking at interpreter.

Person 4: For short messages, like "let's meet and the pub", I'd rather text, but for two way conversations I prefer video.

Person 3: For conveying emotion, video is much better, because there is no emotion in text. But with signing over video you have that context and can see it.

Do you have any problems with your current technologies? Is there any one that you would consider a "bad" technology?

Person 3: The relay service is crap! They need to give away the contract. There have been ongoing problems.

Person 1: The online doesn't work with all computers. There are real problems with Macs, and it needs a specific browser. It should be available anywhere. Not all deaf are using the same computers the same ways, so the service needs to be more available. It shocked me that there is no iPhone app for national relay service.

Person 3: No one uses TTY now. It's so outdated.

Person 2: My only problem with technology is you need to recharge them. If the battery dies you are done.

Person 4: Captel [captioned telephone] is being trialed now. I am not comfortable with it. I can talk on the phone and they can hear my voice but I can't hear them, so I have to wait for the captions to come up on the screen. I find it incredibly frustrating because of the lag time with captioning is about 5-7 seconds and the other people don't really understand why I'm not responding or how I'm hearing them.

How do you learn about new technologies?

Person 2: The wider community, television advertises what's available. Mobile phones came out and then SMS was developed and they started marketing them to the deaf. Now they have smartphones.

Person 1: Word of mouth mostly, other deaf people. Talking about how they communicate with their friends and family, and what works best for them.

Do you use the VRI service?

Person 1: No

Person 4: No, but I have contacted a New South Wales deaf group using VRI. I think the problem is it's too costly for personal use. And there is no difficulty in Melbourne getting interpreters.

Person 3: I heard in an emergency you can use your iPad to connect to the VRI if you can't get it booked.

Person 1: But it's just easier to deal with in-person because of the drop off of the video quality.

If you could have a Smartphone app that would send a video of you signing over service like an sms, would you use it?

Person 1: We already do that. I can send a video message over my phone.

Person 4: We're behind with video technology in Australia. I think speed with broadband is the biggest problem.

Person 2: I use Tango they have a record function, so if I send a video and she's not on, I can still send it and she will get it later.

What things do you look for in technology?

Person 2: I know in US the cost of services is much cheaper with unlimited data. Here we pay much more.

Person 3: Speed of connection is the most important. And the quality because you can't do any more with the technology if the hardware isn't good enough.

Person 1: Coverage is the biggest issue. I've had to switch my carrier three times because I don't have service most places. I switched to the premium company because it had the best coverage, but it is much more expensive. The phone plays a major role in our communication. Guaranteed coverage is what I want.

What problems do you face that you would like to fix with a new technology if you could?

Person 1: Something I think about is what would happen if we had long term with no electricity. How would I know what was going on? Would I have to rely on hearing people to tell me

everything? It made me realize how dependent we are on power. We had the bush fires on Black Saturday and the floods in Queensland...how do deaf people cope in those issues?

Person 4: During the floods, the emergency services sent text messages in Queensland. Technology is improving, but it's still difficult to contact people who are not deaf, and we still need an intermediary. I still have difficulty talking to my mother. I can't be bothered with writing a letter, and I don't want the text-based communication. Skype with captions would be ideal. I could go through a service, but I would rather talk direct to her. I tried that with Captel, but she didn't quite understand how it was working. But Skype with captions I could see her and she could hear me and I would read her response. That's what I'd like to see

Person 1: In New Zealand you can text the 111 emergency service. That is one great thing New Zealand does that I would like to see in Australia.

Person 5: I would like to be able to communicate with my parents and friends in the US. I wouldn't say happy with technology we have in Australia now. The US relay service is better. Australians don't have as easy access. It seems like the deaf in the US have much better opportunities

Person 2: Facetime or Skype is fine with people who are deaf, but it doesn't work with the non Deaf.

Person 1: VRS in trial mode now only during business hours. I want to know why they take so long with the pilot. If it works it works. I want better access to the VRS.

Do you have any comments for us or other concerns you would like to bring up?

Person 2: I think the ideal technology would be holograms like in Star Wars. It would be cool because then you could see the whole body and see full body signing. Most current videos only show you the waist up, but there are many signs that involve more than that.

Person 1: I want interpreting on demand, so that people can access and interact with the interpreter anywhere and everywhere.

Person 2: My boss would rather have an in-person interpreter. He's not interested in investing in tech to communicate with me.

Person 1: I went to job interview and I asked if they could organize interpreter, but when I got there they had not organized one and we had to reschedule, and had to come back the next day. If I had an iPad that I could use with the VRS than I would not have had to reschedule.

Person 3: I think that if the technology were a low enough cost the use would increase. The government will fund up to a point if you apply for the technology, but cost is a real point.

Person 1: You shouldn't have to apply.

Person 4: Where is the support for deaf people. I am lucky because I received hearing aids from the government aid program through workplace modification, but hearing aids have now been taken off that list and aren't available to others.

Person 1: Any speech to text converter. I am unable to receive voicemail, but something to convert voicemail to text would be good. Phone plans give x amount in voice, data and other minutes, but as a deaf person I would like to see the voice minutes applied elsewhere because I am paying for something I don't use.

Person 3: E communication in states. It's laptop with speaker and microphone. Animation application or program. Would convert it into sign.

Person 1: But how would interpretation work because of different grammatical structure.

Person 4: Dragon dictation software for voice to text. I use it with my iPad. I held phone to my iPad so voicemails I got would be converted to text. It wasn't always accurate, but at least it gave me some sense of what people were saying so I could respond. But I had people call me and leave message and I was paying for them, but I couldn't access them so I had my provider disconnect my voicemail service.

Person 1: I have message on my voicemail saying that I am deaf, so don't leave message because I won't get it, but people still leave them! Another technology that would be good is if imagine a time as a student if we had iPads provided as part of tuition that had an application. The note taking application that some company provides a speech to text service. I could go to any class and not be limited by having to go to federally funded deaf class. I could go to any university I wanted.

Person 3: I would prefer to look at what we have and see how we can improve it rather that introduce new tech, because any new technology is going to have its problems, I'd rather fix the problems with what we already have. I would rather have interpreter on site, because in a class the technology that is not reliable. What if you have a question for the professor?

Person 4: Interpreters also facilitate two-way communication.

If you could have [a signing avatar] that would interpret spoken words into sign and have a cg character sign it, would you use it?

Person 4: I would use [avatar] if quality were good and if it had facial expression.

Person 1: I just thought about the iPhone Siri application. I have a deaf voice so when I tried it, it can't recognize my voice. If I could sign in and have it respond that would be great. A deaf Siri technology.

You mentioned that you had to switch service providers, is that common? Is there poor coverage all over?

Person 1: There are certain black spots across the country. The coverage in certain parts of my suburb is SHIT, but an hour away it's better there. So does that mean that I am dictated to which service to use?

Person 2: We're dependent on the Internet to communicate, and there are areas that are more connected than others.

Person 4: I have worked out on where on my train route I have a signal while coming to work. There are three black spots.

Person 5: I know that there is one black spot on my route.

Person 4: I know that people in the country have more black spots.

Person 1: Telstra is premium, but they are the most expensive.

Person 2: In other countries, like the US and in Europe, if you go to your provider and you're deaf they give you better coverage.

Person 3: In New Zealand we had 3G coverage and that was great, people were lining up for it. Deaf people got unlimited calls through 3G for $30 a month

Person 1: I am not looking for pity, I am asking for equivalent plan, but one that suits my needs.

Person 4: We spend a lot on data but not a lot on voice.

Person 1: I just thought of captioning for movies and so on. In Australia, we had one open captioning at cinemas, but now the regulations have changed. The new technology is dreadful. It's a hassle, and it's not user friendly. You're expected to use it in the cinema and I can't. It's massive and embarrassing. Open captioning is preferable, but they think others are inconvenienced. It gave me a headache, now I think it's better to pirate the movie. And I hate going to video store to get a movie then find out its not captioned once I get home. I know I am responsible for checking, but why can't it just all be captioned.

Person 4: There is a captioning app on iPhone to watch the movie on the iPad next to it, but it'd be nice to have open caption.

Person 1: Also TV is not all captioned. At certain times it is required to be, but at other times it's up to station's discretion.

Person 2: Another thing is some airlines now haves safety videos interpreted in sign language, but I'd like to see more of that.

Appendix E – Notes from Interviews

Date: January 16, 2012
Type: Phone Interview
Interviewee: Tony Bennets, Chief Infromation Officer, Australian Communication Exchange

Notes:

- ACE is Non-profit 16yrs old
- The National Relay Service (NRS) call center is the predominant service that ACE provides.
    - At the call center a Relay office will receive a message from a deaf person on a TTY machine, read that message to the hearing party, then type the hearing person's response for the deaf person to read
    - The NRS also functions as an emergency service for deaf individuals to contact emergency services if they are in need.
    - The call center provides services to all of Australia and handles about 2500 call per day. In the United States, there is typically on call center per state, but in Australia is it one provider for the entire country.
    - The NRS functions with a contract with the Federal Government who provide the funding for the service.
- The NRS relies on TTY to provide its service, but TTY is an older technology, so ACE has begun to look and the challenges that TTY is causing, and how to address these problems.
    - The main three challenges are the Speed of communication, the lack of mobility and the fact that Auslan is not supported.
    - The speed of communication on the NRS is about 45 words per minute (wpm), which is far too slow considering the average human talks at anywhere from 150-180 wpm.
    - A TTY machine is not portable because it need to be plugged into a power source and connected to a fixed-line telephone network.
- In order to address these problems, ACE has begun funding and trialing their own initiatives to see if they can supply a better solution than just the TTY relay service.
    - First, in order to address the fact that TTY does not support Auslan, ACE has introduced a trial version of a video relay service (VRS) to provide a platform for a Deaf person who uses Auslan to communicate with a hearing person using an interpreter over video.

    - In order to address the issue that TTY was too slow for a person who is deaf, but still has the ability to speak, ACE began looking for alternatives and found the Captioned telephone system (CapTel).
        - ACE worked with the company in Madison, WI who owned CapTel to build and provide a platform for CapTel in Australia.
        - CapTel is a telephone that can either used a web-based program or is a handset with a screen to allow someone who is deaf, but hearing to speak using their own voice, and have the other person's voice converted to text in about 1.5 seconds of being said.
        - CapTel works, by having the phone call automatically routed to a call ceter, where a relay officer who has been specifically trained to speak in a slow, even voice hears what is being said, and respeaks it into a voice to text conversion program that sends the text of the conversation back to the CapTel handset.
        - Captel functions at about 160wpm, which is much faster than TTY.
        - CapTel can be particularly useful for those who have lost their hearing over time.
    - The goal for ACE is to trail these technologies and work with the government to try and incorporate them in the standard relay services.
- ACE's function is to provide services to the community, so in order to understand what people want, they have a large community consultancy program that holds focus groups asking what the day-to-day challenges of being deaf are.
- Other services that ACE looks into are developing smartphone applications that can help aid the deaf.
    - One app, Smart Auslan provides the audio from museum tours translated into Auslan by using a QR code at the museaum
    - Another recently launched app called Silent Tweets provides text-based public announcements that are location specific. If a person who is deaf is at a train station and a change of platform is announced over the PA, Silent Tweets will send him a text message with that information.

    - ACE is also working with the government to provide a mobile emergency program: location based, able to request services while out and about in community
- In terms of technology deaf people want the functional equivalent of what hearing people use. They have the same need to access to things while out and about: traffic, emergency, weather, etc
    - The younger generation in particular is actively looking for technology that provides the functional equivalent of hearing technologies, but the community on a whole is very quick to adapt and adopt technologies.

Date: February 7, 2012
Type: In-Person Interview at Generation E Office
Interviewee: Jeff Bogensberger, Generation E

Notes:

- Microsoft Lync is a corporate version of Skype on steroids. It is not designed for anything but the corporate setting.
- It can use Lync-compatible phone handsets that can range from $500 to $800, but it does not require them, as Lync can function as a phone through the computer using a headset.
- As this technology continues to expand, will probably see headsets replacing phone handsets because they are much less expensive. And as more and more communication is being done over the computer and Internet, it will be easier to have everything incorporated as one.
- Lync is about 1.5 years old and because it is designed for corporate use it is not typically included in any Microsoft Office suites, but there are a few licensing packages that include Lync with other Office programs.
- There are different levels of Lync packages. The basic package includes only Lync to Lync calls, but with the more advanced packages Lync can function as a phone and call any telephone number. Lync incorporates phone, email, IM and video chatting into one program.
- Lync is also beginning to be used in telecommuting, especially in telepsych or telemedicine, in which being able to see the patient is important to diagnoses when conducting sessions or interview over the Internet.
- For businesses, Lync allows you to teleconference with up to 250 people, but you can only see one person at a time. There is extra equipment you can purchase to allow more people to be seen at once, but it can cost up to $60,000.